HARP SF XTREME

By Nicholas HM Caldwell

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INTRODUCTION

Welcome to HARP SF Xtreme! This book is the second core rulebook of HARP SF, the science fiction role-playing game. HARP SF Xtreme expands the HARP SF rules set to cover vehicles, vehicular combat, robots and new character options.

❂ HARP SF Xtreme and HARP SF

The original HARP SF manuscript was a large book; the efforts of the alpha playtesters and the public betatest made it an even better and larger book. It had become too large a book for it to be sensible for Guild Companion Publications to publish it as a single volume, especially as a print edition. Thus the manuscript has been split into two volumes. This volume has a comprehensive collection of vehicles, spacecraft, vehicle combat rules for use on planets and in space, nano and cybertechnologies to upgrade humans and aliens, and character creation rules for robots and artificial intelligences. The first volume contains the character creation rules for human and alien characters, equipment, personal combat rules, adventuring rulings and guidance, psionics, information on the Tintamar setting, and a chapter of campaign suggestions and advice for the System Operator. If you do not already have HARP SF, then buy a copy now!

❂ Designer Notes

I would like to thank Alison Mitchell for her efforts in locating obscure science-fiction novels and assisting my research.

This book has benefited greatly from the comments and critiques of my elite playtesters, most especially David Bate, Quinton Carroll, Jonathan Dale, Andrew Davies, Matt Fitzgerald, Keith Grainge, Jesse Hall, Monte Iafrate, Chris Jowett, Brent Knorr, John Lees, Dave Prince, Andrew Ridgway, Aaron Smalley, Marc Staubitz, and Stephen Watts. Thanks also to Dave Cheever for his excellent original starship deck plans which have been redrawn by Craig John and Joel Lovell for print quality, to the community on the ICE forums for planet names, and to everyone who participated in the public beta playtesting and contributed feedback.

And finally, I would like to humbly thank just a few of the world's finest science fiction writers for entertaining and inspiring me – Poul Anderson, Isaac Asimov, Marion Zimmer Bradley, Sir Arthur C. Clarke, Gordon R. Dickson, Alan Dean Foster, Simon R. Green, Peter F. Hamilton, Robert A. Heinlein, Frank Herbert, Richard Morgan, Linda Nagata, Larry Niven, Jerry Pournelle, E.E. "Doc" Smith, Brian Stableford, Jack Vance, and David Weber.

VEHICLES

Exploring new worlds, contacting hitherto undiscovered alien civilizations, and seeing the universe are fundamental to the larger-than-life exploits of many futuristic heroes. Getting out there and getting back can be adventures in themselves.

WHEN IS A VEHICLE MANEUVER NEEDED?

While a brisk walk is good for the health, and riding beasts capture the true spirit of the great outdoors, vehicles win out every time for long-distance and rapid travel. Getting safely from point A to point B is not a guaranteed outcome, whether the journey is cruising down a river or an interstellar voyage from Sol to Tau Ceti. It is always a test of the driver or pilot's skill.

However, it is neither necessary nor exciting to require maneuver rolls for every journey. Driving down to the local shopping mall to buy some groceries is not normally a task of high drama. If the player has indicated the character's intention to drive there at high speed in atrocious weather conditions, then a dice roll is in order – maybe the character has more skill than common sense. Certain tasks, such as aircraft takeoff and landing, should normally be rolled as these are inherently risky. Space travel is never routine and maneuver rolls should always be required for docking, landing, takeoff, and hyperspace jumps.

For land, sea, and air, a vehicle maneuver roll should be made once per hour to determine how far the vehicle has actually traveled, and whether the vehicle has had a mishap (such as a malfunction or a collision). SysOps may only require that a maneuver be made once per day if the journey is particularly long, the terrain is relatively constant, and the nature of the trip is not hazardous. For travel in normal space, the SysOp should normally insist on a maneuver roll once per hour in crowded areas of space (the Earth-Moon system, the Asteroid Belt, and Jupiter's Trojan points would count as "crowded" regions), but a maneuver roll once per day would be sufficient in clear space (e.g. the solar system beyond Jupiter except close to the outer gas giants and their satellites).

✪ Tintamar Knowledge Base: No Maneuver Rolls in Hyperspace

No vehicle maneuver rolls are necessary once a starship has successfully entered hyperspace. The critical maneuver is made as the starship prepares to enter hyperspace.

VEHICLE SKILLS AND MANEUVERS

The relevant skills for these maneuvers are Driving for all land vehicles, Marine Pilot for all powered surface and submarine vessels, Air Pilot for all aircraft and spacecraft maneuvering within an atmosphere, and Space Pilot for all spacecraft outside an atmosphere.

The driver/pilot chooses his intended speed (from zero to the vehicle's maximum velocity), and then a d100 open-ended roll is made, adding the character's appropriate driving/piloting skill, and applying all applicable modifiers from the Vehicle Maneuver Chart (see below). The result of this maneuver is looked up on the Percentage column of the Maneuver Table. If the result is a Fumble, then a Vehicle Fumble should be rolled. If the result is a Failure, then the SysOp may allow this to be a relatively harmless event (groundcar stalls, pilot has flown plane in the wrong direction for a time, etc.) and allow the embarrassed player a reroll to recover the situation. Alternatively the SysOp may require a roll on the Vehicle Fumble Table. Any result other than Fail or Fumble gives the percentage distance traveled in the time period covered by the maneuver. Results greater than 100% may be generated using this method – the SysOp may rule that some or all of the excess was the consequence of favorable circumstances, e.g. a strong tailwind assisting an aircraft, little traffic on a highway, etc. However, the SysOp is entitled to cap the maximum distance traveled (to 100%) if the vehicle is traveling at maximum velocity and no favorable circumstances can be rationalized, which is normally the case with space travel.

❽ **Example:** *Much to her disgust, the Belter pilot Seraph has to fly a cargo air transport from Lowell City to Heinlein Base. Seraph decides to fly the transport at a speed of 375 km per hour (75% of its maximum velocity, so −20), the weather is poor with moderate rain (-10), and winds of 20 km per hour (-20), and the transport has +0 Maneuverability Rating. Total modifiers are −50. Seraph's player rolls 45, adds 65 for Air Pilot skill, and then subtracts 50 for a final result of 60, giving a percentage result of 50%. The transport travels 50% of 375 km or 187.5km in the first hour.*

In the second hour of the flight, the rain stops, reducing the overall penalty to −40. Seraph's player rolls 96 – an open-ended result – followed by 72 on the second roll. Totaling the numbers, the Air Pilot maneuver is 96 + 72 + 65 (from skill) – 40 (speed and wind) equals 193. Looking up 193 on the Percentage column yields 140%. Multiplying the transport's speed of 375 by 1.4 equals 525 km per hour, 25 km per hour faster than its safe maximum velocity. The SysOp allows Seraph 20 km per hour for a helpful tailwind, so the transport travels 520 km in the second hour. So as long as Seraph can land the wretched transport safely, she'll be back on her own starship shortly.

Special actions such as docking, landing, take-off, and hyperspace jumps should be resolved as All-or-Nothing Medium vehicular maneuvers. Again, an open-ended roll is made, the appropriate vehicle skill added, and all appropriate modifiers from the Vehicle Maneuver Chart applied.

- If the result is a success (101 or more), then the action was successful.

- If the result is an ordinary failure, then the pilot realizes just in time that catastrophe is imminent and can attempt to abort (by making a Very Hard All-or-Nothing piloting maneuver).

  - If the abort maneuver is a success, then the pilot has managed to forestall disaster through emergency braking, increasing altitude, shutting down the magneto-gravitic drive, etc.

  - If the abort maneuver is a fail or fumble, then the vehicle will crash if docking, landing, or taking off (see Vehicle Crashes, below) or will open a hyperspace wormhole to the wrong destination (see Hyperspace Failure, below)

- If the result is a fumble, then either a Vehicle Fumble must be rolled and the vehicle will crash (see Vehicle Crashes, below) or a Hyperspace Failure must be rolled.

❽ **Example:** *Time for Seraph to land that transport. At Heinlein Base, wind speed has increased to 30 km/h (-30 penalty), but Seraph has landed vehicles here before (+20 bonus). The total modifier is –10 (-30 + 20). Quin rolls the dice for Seraph – 06. So close to a fumble! Maneuver result is 6 + 65 –10, leading to a total of 61, a failure. Seraph brings the aircraft in far too fast, only catching her mistake a split second before she would have smashed into the landing pad. Can Seraph recover in time? Quin rolls the dice again for a Very Hard All-or-Nothing Air Pilot maneuver. The dice say 87, adding 65 for skill, and subtracting 50 (-30 for wind, +20 for successful prior landing, -40 for Very Hard), yields 102. Somehow Seraph manages to pull the vehicle up mere centimeters from impact.*

Table 1.1 Vehicle Maneuver Chart	
Circumstance	Modifier
General Modifiers	
Driver/Pilot stunned	-50
Driver/Pilot drunk/drugged	-10 to −50 (according to severity)
Combat Driving/Piloting	-50
Vehicle Maneuverability Rating (not offensive or defensive maneuvering)	+/- variable
Vehicle Velocity	
0-25% of maximum	+0
26-50% of maximum	-10
51-75% of maximum	-20
76-100+% of maximum	-40
Quick Turn Maneuver	-20
Double Back Maneuver	-40
Stunt Maneuver	-60
Cautious Maneuvering (minimal velocity)	+20
Light "traffic"	+0
Heavy "traffic"	-20
Driving Only	
Precipitation:	
Light Rain	-5
Moderate Rain	-10
Heavy Rain	-20
Light Sleet/Snow/Hail	-10
Moderate Sleet/Snow/Hail	-15
Heavy Sleet/Snow/Hail	-25
Traffic/Built-up Environment and Absolute Velocity	
Driving in traffic with an absolute velocity of up to 50 km/h	+0
Driving in traffic with an absolute velocity of 51 - 100 km/h	-10
Driving in traffic with an absolute velocity of 101 - 150 km/h	-20
Driving in traffic with an absolute velocity of 151 - 200 km/h	-40
Driving in traffic with an absolute velocity of 201 - 250 km/h	-60
Driving in traffic with an absolute velocity of 251 - 300 km/h	-80
Driving in traffic with an absolute velocity of more than 300 km/h	-100
Visibility	
Each full 50m < 1km (fog, smoke, etc)	-5
Night	
If vehicle has lights/night sensors	-10
If vehicle has no lights/night sensors	-50
Environmental Conditions	
Surface wet	-10
Surface snowy	-20

Table 1.1 Vehicle Maneuver Chart	
Circumstance	Modifier
Surface icy	-40
Severe winds (per 10 km per hour of windspeed)	-5
Terrain versus Vehicle Type	
Ground effect in wood/jungle	-30
Tracked in marsh/swamp	-20
Tracked on road	0
Tracked in rocky or broken terrain	-10
Tracked in sandy desert	-10
Tracked in wood/jungle	-40
Wheeled in marsh/swamp	-30
Wheeled on road	+0
Wheeled in rocky or broken terrain	-20
Wheeled in sandy desert	-20
Wheeled in wood/jungle	-40
Walker in marsh/swamp	-20
Walker in rocky or broken terrain	-10
Walker in wood/jungle	-30
Marine Pilot Only	
Precipitation (surface travel only)	
Light Rain	-5
Moderate Rain	-10
Heavy Rain	-20
Light Sleet/Snow/Hail	-10
Moderate Sleet/Snow/Hail	-15
Heavy Sleet/Snow/Hail	-25
Visibility	
Each full 50 m < 1 km (fog, smoke, etc)	-5
Night/Underwater	
If vehicle has lights/night/sonar sensors	-10
If vehicle has no lights/night/sonar sensors	-50
Sea Conditions (surface travel only)	
Each meter of wave height	-5
Each 5 km per hour of wind speed	-5
Air Pilot Only	
Precipitation	
Light Rain	-5
Moderate Rain	-10
Heavy Rain	-20
Light Sleet/Snow/Hail	-10
Moderate Sleet/Snow/Hail	-20
Heavy Sleet/Snow/Hail	-30
Wind Conditions	

Table 1.1 Vehicle Maneuver Chart	
Circumstance	Modifier
Each 10 km per hour of windspeed	-5
Visibility	
Each full 1 km < 10 km (fog, smoke, etc)	-10
Night	
If vehicle has lights/night/radar sensors	-10
If vehicle has no lights/night/radar sensors	-30
Landing	
Unpaved surface	-20
Unmarked area	-30
Pilot previously landed safely	+20
Landing with instrumentation only	-40
Space Pilot Only	
Sensors	
If vehicle has active sensors	+0
If vehicle is relying on passive sensors	-20
If vehicle is flying without sensors	-40
Docking	
Improvised area	-20
Pilot previously docked successfully	+20
Docking with instrumentation only	-40
Vehicle Acceleration	
0-25% of maximum	+0
26-50% of maximum	-10
51-75% of maximum	-20
76-100+% of maximum	-40
Space Environment	
Asteroid Field	-10 to −100 (vary by density)
Gas Cloud or Nebula	-10 to −50 (density and material)
Gravity well (within ten diameters from ice ball world or large moon or planetoid)	-10
Gravity well (within ten diameters from rock planet, i.e. Earth, Mars, etc))	-20
Gravity well (within ten diameters from small gas giant, i.e. Uranus or Neptune))	-40
Gravity well (within ten diameters from large gas giant, i.e. Jupiter or Saturn))	-60
Gravity well (within ten diameters from a star)	-80
Miscellaneous	
No course plotted	-50
Hyperspace insertion via Lagrange Point	-20
Hyperspace insertion via Portal	-40

Table 1.2 Hyperspace Failure	
Roll	**Result**
01-25	A very slight discrepancy in your course means that you will miss your destination by d10 light-years.
26-50	Accumulated rounding errors means that your course is off by 2d10 light-years. Hope you weren't in a hurry.
51-75	You were lucky you transposed some of the trailing digits or you'd be en route to Andromeda. As it is, you'll miss your destination by 2d10 + 20 light-years.
76-00	Did you compute a course or just type in random digits? Your course is off by 5d10 + 50 light-years. Good luck getting home.

For all Hyperspace Failures, the SysOp makes the roll to determine how far off-course the starship actually is and decides the direction of the undershoot or overshoot.

In the Tintamar setting, starships can only safely exit hyperspace at a portal exit point or a Lagrange Point. Hence the starship will return to normal space at the nearest portal or Lagrange Point to the computed actual destination. Unfortunately for the crew of the errant starship, they'll only discover where they really are once they exit hyperspace, although they may guess that something is wrong when they don't complete their transit at the expected time.

Table 1.3 Land/Marine Vehicle Fumble	
Roll	**Result**
01-25	You've just stalled the vehicle. Take 5 rounds to restart the engine.
26-50	Get a grip. The vehicle is weaving from side to side. Anyone or anything in your way will be hit. It'll take you 5 rounds before you can straighten the vehicle out.
51-75	Poor handling causes damage to the vehicle's propulsion systems (i.e. tires, hydrofoils, brakes, engine). −20 penalty to all further use of the vehicle until repairs are made (cost 2% of the vehicle)
76-00	You flip the vehicle upside down or crash it (SysOp's choice). Vehicle takes a Medium Crash Critical Strike. Roll d100 on the Impact Critical Strike table for anyone in the vehicle.

Table 1.4 Air/Space Vehicle Fumble	
Roll	**Result**
01-25	Pay attention to your controls. The vehicle lurches in a random direction (1 km if cruising, 50 m for landing, takeoff or docking). If there was anything in the way, you just hit it.
26-50	Your aggressive piloting causes minor damage to the propulsion system. −10 penalty to all further maneuvers until damage is repaired (cost 1% of the vehicle).
51-75	This isn't an arcade game. The propulsion system suffers significant damage from your stupid piloting and the vehicle is at −20 to all further maneuvers until repaired (cost 2% of the vehicle)
76-00	That wasn't very clever. You just shut down the engines completely. If you were flying in atmosphere, your vehicle is now falling fast – an Extremely Hard All-or-Nothing Engineeing (Transport) maneuver is needed to save you from crashing by restarting the engines. If you were in space, you'll carry on your current orbit until the engines can be restarted which will take at least ten minutes or an Extremely Hard All-or-Nothing Engineering (Magneto-gravitic) maneuver.

NATURAL HAZARDS AND CRASHES

Wild animals, careless jaywalkers, hidden reefs in shallow waters, space debris and rogue asteroids are some of the varied hazards encountered by vehicles. Wary drivers and pilots will be alert to such dangers, and may be able to avoid disaster with a timely All-or-Nothing vehicle maneuver. The SysOp sets the difficulty of such maneuvers, applying all germane modifiers from the Vehicle Maneuver Chart. The difficulty should normally be at least Medium.

Likewise if the driver/pilot wishes to deliberately collide with something or someone that cannot dodge out of the way, a similar vehicle maneuver must be made. If the target of a deliberate collision can dodge, then the driver/pilot of the ramming vehicle first makes a vehicle maneuver as described above, and if it is successful, then the result is looked up on the RR column of the Maneuver Table. The driver/pilot of the vehicle about to be rammed may then make their own vehicular maneuver, applying all germane modifiers from the Vehicle Maneuver Table, and comparing their result against the RR target, avoiding the collision if they meet or exceed the target number. If the target of a ramming attack is a person, they may attempt a Medium Acrobatics/Tumbling maneuver to get out of the way and will succeed in this if their maneuver result meets or exceeds the RR value set by the ramming driver/pilot.

When a vehicle is involved in a collision or crash, there is likely to be damage to the vehicle (and injury to anyone in or on the vehicle). This is resolved by making an attack against the vehicle. The "OB" of the attack is the speed of the vehicle in km per hour (divided by 5, rounding up). If the vehicle collides head-on with a moving object or vehicle, then its speed in km per hour (divided by 5, rounding up) is added to the OB.

Example: *While patrolling the swamps of Heraclion, Sergeant Latham rams her speedboat into an underwater rock spur. Latham was cruising at 50 km per hour, so the OB is 10 (50/5).*

Example: *As a result of sabotage, Dack loses control of his groundcar on a crowded highway, and it slams into an oncoming car. Dack's car was doing 120 km per hour; the other car was at a comfortable 100 km per hour. The total OB is 24 (120/5) + 20 (100/5) or 44.*

The only DB that the vehicle can claim in a collision is its Armor Rating (if any) and its Shield Rating (if any).

To resolve the crash, make an open-ended percentile roll, adding the crash OB and subtracting the vehicle's DB. If the Total Attack Roll is 1 or higher, then the vehicle is damaged. The result is looked up on the Vehicle Crash Critical Table, with the Total Attack Roll being adjusted by the size of the crash. If the collision/crash involves two or more vehicles, make attack rolls against each vehicle. If a vehicle collides with a person or creature, then make an attack roll against the person or creature as above, but resolve as an Impact critical as described in the Vehicle Combat chapter, Personal Combat and Vehicular Combat section.

Suggested Attack Sizes	
Animal (Small or Medium)	Tiny
Animal (Large)	Small
Animal (Huge)	Medium
Asteroid/meteor (a large stone)	Tiny
Asteroid/meteor (person-sized)	Small
Asteroid/meteor (car-sized)	Medium
Asteroid/meteor (house sized)	Large
Asteroid/meteor (hill-sized or larger)	Huge
Boulder	Small
Building (wooden)	Small
Building (stone or brick)	Large
Fire Hydrant	Tiny
Highway Divider	Small
Lamp post	Small
Person	Tiny
Telephone pole	Tiny
Tree	Medium
Vehicle (of smaller size)	Small
Vehicle (of same size)	Medium
Vehicle (of larger size)	Large

FLIGHT AND PURSUIT

When a plan goes wrong, discretion is often the better part of valor. It's at times like these when characters appreciate a fast getaway vehicle. Of course, law enforcement and anyone else that the heroes have upset are just as willing to give chase.

The SysOp needs to keep track of three values at all times:

The distance separating the vehicles;

The speed of each vehicle;

The direction of travel of each vehicle.

If it was just a matter of accelerating to maximum velocity, then whoever was in the fastest vehicle would always win the chase. Chases are however tests of skill and luck for both the pursued and the pursuer(s).

Each unit of time of the chase, the driver/pilot of the pursued vehicle must make a vehicular maneuver, adding their relevant skill and applying all the modifiers from the Vehicular Maneuver Chart, and looking up the result on the Percentage column. Failing or fumbling this maneuver has all the dire consequences described above, plus the chasee may well be caught! The Percentage result is used to determine how far the pursued vehicle has actually traveled (multiply the speed by the percentage and the time taken).

The drivers/pilot(s) of the chasing vehicle(s) must also make vehicular maneuvers, adding their relevant skill(s) and applying all the modifiers from the Vehicle Maneuver Chart, and looking up the result on the Percentage column. If the driver/pilot of a chasing vehicle fails or fumbles this maneuver, then that chasing vehicle is likely to be out of the pursuit (in addition to any other problems they may have). Otherwise calculate the distance traveled using the Percentage result.

In this way, the gap between the pursued and the pursuing can widen or close.

Example: *Having obtained confidential data from a company suspected of supplying Federation tech to Interdicted worlds, Jung and Weaver are fleeing in a stolen groundcar hotly pursued through city streets by three corporate cops on gravitic bikes. Jung is driving; Weaver is trying to mind control the cops to end the pursuit ("This is not the stolen groundcar you are looking for"). Jung is trying to drive at a high speed (180 km/h or 3 km/min) in a groundcar with a maximum speed capability of 300 km/h and a +0 Maneuverability Rating. Although traffic is light this early in the day, trying to drive at that velocity in an urban area will make for a terrifying driving experience. Matt rolls 63 for Jung, adds 72 for Driving, and subtracts 60 (-20 for velocity, +0 for traffic, -40 for desired absolute velocity of 180 km/h), so total is 75, which is 70% or 2.1 km this minute. Rolling for the cops who are trying to drive at a speed of 250km/h (with maximum gravbike capability of 500 km/h and +0 Maneuverability Rating), the SysOp gets 03, 91, and 28. The first cop has fumbled, gets 20 on the fumble and stalls his vehicle. He's out. The other cops add their skills of 85 and subtract 70 (-10 for 50% of maximum velocity and –60 for high speed in traffic) from their rolls, for results of 106 (100%) and 43 (40%). The second cop hurtles after Jung at 250km/h (4.2 km/min) closing the gap followed by the third cop at a relatively sedate 100km/h (1.6 km/min). Both cops are in hot pursuit.*

If the vehicles aren't involved in a shooting match, then the maneuver rolls should be made once per minute on land, at sea, in the air, and in crowded space (when the vehicles are traveling at high velocities). In clear space, the maneuver rolls should be made once per hour. If the vehicles are involved in a shooting match or the vehicles are very close together at the start of the chase, then maneuver rolls may need to be made as often as every round.

Drivers/pilots can also attempt to shake their pursuers by more daring actions, if the environment permits. In a busy city, a driver could try to make a quick turn down a side street (hope its not a dead-end!) or double-back on himself. On water, a boat pilot could deliberately take his craft into shoals in the hope of grounding the pursuers. In air, a pilot could dive towards the ground or ascend steeply, pushing his plane to the limit, daring the foe to follow suit. In space, a pilot could make a very tight trajectory around a planet or skim asteroids.

In these cases, the pursued driver/pilot makes a vehicular maneuver as normal, but applying the relevant modifier for Quick Turn, Double Back or Stunt maneuver in addition to all other

relevant bonuses and penalties. The maneuver is resolved as a Skill versus Skill contest. The result is looked up on the RR column of the Maneuver Table. If the outcome is a Fail or Fumble, the driver/pilot and vehicle suffers the appropriate consequences. Otherwise the result is the target number that the pursuers must equal or beat if they wish to continue the chase.

⚅ **Example:** *Jung decides that the cops will catch him and Weaver unless he tries something unexpected. Seeing a likely junction coming up, he reduces velocity to 150 km/h and thne whips the car round to the left at the last moment. Matt rolls 62, adds 72, and subtracts 50 (-10 for 50% velocity, +0 for traffic, -20 for velocity of 150 km/h in an urban environment, -20 for Quick Turn), for a total of 84, which is a target number of 100 from the RR column. The SysOp rolls 86 and 80. The lead cop is still gunning his bike at a velocity of 250 km/h (-10 for 50%, -60 for high speed, -20 for stunt), so 86 + 85 – 90 equals 81, well below the target of 100, so he misses the turn and spins off out of the pursuit. The other cop increases his speed to 150 km/h (30% of max = -10 penalty, 150 km/h is –20 in this environment, -20 for stunt). 80 + 85 –50 equals 115, so he spots Jung's maneuver in good time, executes his own and maintains the pursuit.*

A chase will normally come to an end when:

- ▸ One vehicle or the other is disabled or destroyed
- ▸ The pursuing vehicles break off the pursuit
- ▸ The pursued vehicle is stopped or captured (runs out of fuel, reaches a dead end, etc.)
- ▸ The vehicles can no longer detect each other, usually because the distance between them exceeds their sensor ranges
- ▸ The chased vehicle reaches a safe place (e.g. a friendly base, crosses a border, makes a jump into hyperspace without having its destination determined by the pursuer's sensors.)

⊕1Tintamar Knowledge Base: Slower Than Light Travel

The magneto-gravitic drive is the key technology used in traveling between planets. This is a "reactionless" drive in that it does not require "reaction mass" to be ejected in one direction at high speed in order to propel it in the opposite direction. For SysOps and players, this removes the need for fuel calculations and eliminates a major source of bookkeeping. The principal energy source is nuclear fusion, so SysOps and players who have a fondness for detail, can still monitor fuel reserves for starship reactors. In the future of the Tintamar setting, civilization will move beyond nuclear fusion to harnessing the quantum energy fluctuations of vacuum itself, but that day has yet to arrive.

Artificial gravity and antigravity are related technologies to the magneto-gravitic drive. Together, they allow spacecraft to accelerate and decelerate at hundreds of "gees", without the "gee" forces crushing their organic crews. Six hundred "gees" is a typical maximum acceleration for a Federation scoutship.

SLOWER THAN LIGHT TRAVEL

In normal space, the speed of light (denoted c) is the upper limit on speed, and only an object of zero or infinite mass can travel at lightspeed (approximately 300,000 km/sec). Interplanetary space is not empty and the interaction of solar wind particles and other debris with the magneto-gravitic drive and shields limits the maximum speed of civilian spacecraft to 0.035c (10,500 km/sec) and military vessels to 0.07c (21,000 km/sec) inside a solar system. Space missiles can reach 0.1c and even 0.14c, but they are not intended as reusable vehicles and don't carry live crew! (The lower limit on slower-than-light travel means that SysOps can ignore the effects of relativity as well.) Beyond the heliosphere of a solar system (in the Kuiper Belt for Sol System), ships can travel up to 0.14c through the interstellar medium. Higher speeds may be possible but would necessitate much stronger shields.

Light requires 499 seconds to travel from the Sun to the Earth. This distance (the average distance from the Sun to the Earth) is approximately 150,000,000 km and is known as one astronomical unit (au). A Federation scoutship can travel one au in just under two hours at 7% of lightspeed.

To determine such issues as how long it takes to reach a specific velocity, how far a spacecraft travels in a specific time, and how long it takes to reach a certain point will require a few relatively simple equations. (To make the lives of SysOps easier, the most frequently used values have also been precalculated and can be found in Tables 1.5, 1.6, and 1.7)

The first most basic equation is used whenever a spacecraft is traveling at a constant velocity (speed in the same direction).

$$S = D/T$$
$$D = S \times T$$
$$T = D/S$$

where S is velocity, D is distance traveled, and T is time taken.
The second equation is

$$V = U + (A \times T)$$

where U is the initial velocity, A is the acceleration, T is the time taken, and V is the final velocity. This equation is also useful for determining how long it takes to reach a specific velocity.

> ❽ **Example:** *The scoutship, Faffin' Around, is rated for 600g acceleration. One g is an acceleration of 10 meters per second squared (m/s2). 600g is 6000 m/s2 or 6 km/s2. If the ship starts at zero velocity ("rest") and accelerates at 600g to 0.07c, then it will take it 3,500 seconds to reach that speed. Set U=0, A= 6, and V=21,000, so 21000 = 0 + 6T, so T=21000/6 = 3500, or 58 minutes and 20 seconds. If the ship used a slightly reduced acceleration of 583.3g, then the time T would be 21000/5.833 or almost exactly 3600 seconds (1 hour).*

The third equation is:

$$D = (U \times T) + (0.5 \times A \times T^2)$$

where D is distance traveled, U is initial velocity, A is acceleration and T is time traveled at that acceleration. This equation is useful for calculating how far a spacecraft will travel during its acceleration or deceleration phases.

> ❽ **Example:** *Let's determine how far the Faffin' Around moves at an acceleration of 583.3g in 3600 seconds, starting from rest. Plugging in the values, we have D = (0 x 3600) + (0.5 x 5.833 x 3600 x 3600) = 37,797,840km, or just over 0.25au.*

Travel in normal space will consist of three phases: an acceleration phase where the vessel accelerates to its cruising velocity, a cruising phase usually at the vessel's maximum speed, and finally a deceleration phase where the craft slows down on its approach to its destination.

> ❽ **Example:** *The Faffin' Around is journeying from Earth to Jupiter. As both Earth and Jupiter orbit around the Sun, the distance between the two planets can vary between approximately 4 au and 6 au. (Jupiter's orbital distance is 5au from the Sun.) On average, the distance is 5au. The scoutship will accelerate from Earth orbit at 583.3g from rest, reach its cruising velocity of 0.07c, and then decelerate near the end of its journey at 583.3g to rest. From our previous calculations, we know that this acceleration to 0.07c will require 1 hour in which time the ship will have traveled 0.25au. Decelerating will also require 1 hour and the ship will again travel 0.25au in this time. Thus the cruising distance is 4.5au (5 – 0.25 –0.25). At a speed of 21,000km/s, this will take just under 9 hours to complete (4.5 x 150,000,000 / 21,000 =32,143s; 4.5au / 0.5au per hour = 9 hours). Total journey time is 11 hours (9 cruising + 1 accelerating + 1 decelerating) – sit back and watch the in-flight movies, gentlebeings.*

The fourth and final equation is necessary to calculate how long it takes an object such as a missile to travel a specific distance given its starting velocity and its acceleration. Mathematically inclined gamers will recognize this as a form of the quadratic formula:

$$T = \frac{-U + \sqrt{(U^2) + (2 \times A \times D)}}{A}$$

where T is time, U is initial velocity, A is acceleration and D is distance.

> ❽ **Example:** *A Silth interceptor has detected the Faffin' Around at a distance of 600,000km. The Silth gunner launches a salvo of missiles. The interceptor is already traveling at 0.07c, so the missiles have an initial velocity of 21,000km/s. These missiles are rated for 1200g acceleration, so A is 12 km/s2. Plugging in the numbers we have*

T = (-21000 + square-root ((21000 x 21000) + (2 x 12 x 600000)))/12

T = (-21000 + square-root (441,000,000 + 14,400,000))/12

T = (-21000 + square-root (455,400,000))/12

T = (-21000 + 21340) / 12

T= 28.3seconds or just over 14 rounds before the missiles arrive.

❽ SysOp's Tip: Simplifying the Mathematics

Few SysOps will want to be solving the quadratic formula to calculate the length of time it takes a salvo of missiles to arrive in the middle of a starship dogfight. By making two assumptions, we can use the much simpler equation T(ime) = D(istance) / S(peed) for distances of up to ten million kilometers. The first assumption is that the starship is traveling towards the target when the missile(s) are launched, and hence the missiles start with the initial velocity of the starship. The second assumption is that the starship is moving at some reasonable speed (i.e. a fraction of lightspeed.) If these two assumptions hold, then the extra acceleration of a missile (even if it is capable of 1200g) will not significantly reduce the time taken to reach the target in game terms of rounds (or turns).

Specifically, the time calculations for a missile launched at 1200g from a starship already traveling at 0.07c will differ by less than a second over a range of one million kilometers. In both cases, the answer will be approximately 47 seconds or 24 rounds or 1 turn. Performing the same calculations for a range of ten million kilometers (same acceleration, same starting velocity), the difference is less than 1 minute as the answer is just over 7 minutes using the accurate formula and just under 8 minutes using the approximation, which means the missiles would arrive in 8 turns in "turn-based" combat (see Chapter 2, Vehicle Combat).

For distances of up to one million kilometers, the SysOp should use the T = D/S formula and convert the result into rounds or turns as appropriate. For distances of between one and ten million kilometers, playing out the game time in rounds will take far too long and slow the game play to a crawl, so convert the results into turns and play the combat using that measure of time. For missiles launched at distances greater than ten million kilometers, the targets will need to detect them first and by the time that happens the missiles should be within the ten million kilometer range or closer and the shortcuts above can be employed again.

SUB-LIGHT TRAVEL TIMES AND SPEED TABLES

To further assist SysOps in keeping the amount of mathematics under control, two tables are provided in this section to cover frequently needed values of speeds, distances and times.

The Travel Speed Table (Table 1.5) should be used to determine how long in hours it takes to travel an astronomical unit at a particular fraction of lightspeed, how long in hours it takes to reach the target speed (or decelerate from it to zero) at particular

accelerations, how many astronomical units would be travelled while accelerating or decelerating, and how long in hours it would take to travel one astronomical unit with acceleration to and deceleration from the cruising velocity. To use the table, select the correct column for the target speed, and use the first value row to read out how long in hours it takes to travel an astronomical unit at a particular fraction of lightspeed, and select the band of rows for accelerations of 100g, 300g, 600g and 900g to read out the other values. Use the Accel/Decel time row for how long in hours it takes a spacecraft to reach the cruising velocity (and for it to decelerate from that speed to zero). Use the AU Travelled row to determine how far a spacecraft would travel in astronomical units when accelerating to or decelerating from the chosen target velocity. Use the 1 AU row to determine how long it would take a spacecraft to travel one au with acceleration to and deceleration from the cruising speed at the start and end of the trip.

The Solar System Distances Table (Table 1.6) is a transit distance table providing the distances in astronomical units between the key worlds of the Solar System. To determine the average distance of a world to the sun, simply cross-index the world row with the Sol column. To determine the range of distances between two worlds, go to the row for the "departure" world and then read off the values in the "Near" and "Far" columns for the "destination" world. SysOps can then choose one of these extreme values or something in-between. Note that the distances in this table are all approximations and do not take account of eccentricities of orbits or divergence from the Ecliptic.
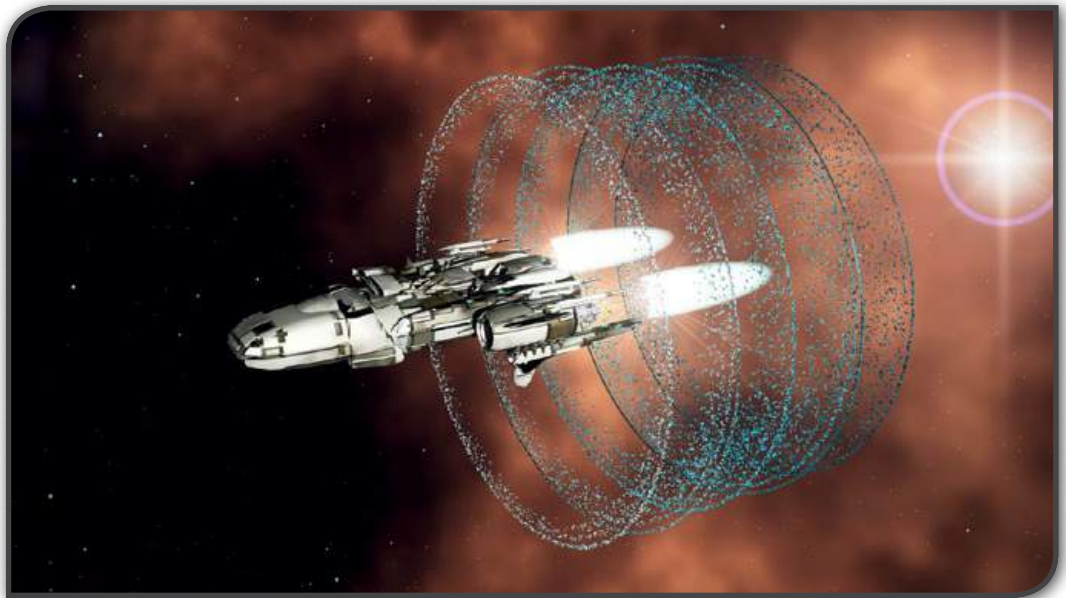
FASTER THAN LIGHT TRAVEL

There are many ways of achieving faster-than-light travel in science-fiction. In the Tintamar universe, a specific mode of the magnetic-gravitic drive enables spacecraft to enter and exit a hyperspace dimension, where vessels can travel much faster than light. This mode is known as the Lagrange Drive, as it can only be safely used in certain areas of space called the Lagrange Points.

For two massive bodies in space, such as the Sun and the Earth, there are five locations in space (the Lagrange Points) where the gravitational forces of the two bodies are in balance with the centrifugal force. Two of these locations (denoted L4 and L5) are sufficiently stable that a body of much smaller mass (a space station or an orbital habitat) will stay in that position. The L4 region is in the same orbit as the smaller of the two large bodies but 60 degrees ahead; the L5 region is 60 degrees behind.

Table 1.5 The Travel Speed Table														
Target speed as fraction of c	0.005	0.01	0.015	0.02	0.025	0.03	0.035	0.04	0.045	0.05	0.055	0.06	0.065	0.07
Time to travel 1 au	27.78	13.89	9.26	6.94	5.56	4.63	3.97	3.47	3.09	2.78	2.53	2.31	2.14	1.98
100g accel /deccel time	0.42	0.83	1.25	1.67	2.08	2.5	2.92	3.33	3.75	4.17	4.58	5	5.42	5.83
Au Travelled	0.008	0.03	0.068	0.12	0.188	0.27	0.368	0.48	0.608	0.75	0.908	1.08	1.268	1.47
1 AU (w accel & decel)	28.194	14.722	10.509	8.611	7.639	7.130	6.885	6.806	6.836	6.944	7.109	7.315	7.553	7.818
300g accel /deccel time	0.14	0.28	0.42	0.56	0.69	0.83	0.97	1.11	1.25	1.39	1.53	1.67	1.81	1.94
Au Travelled	0.003	0.01	0.023	0.04	0.063	0.09	0.123	0.16	0.203	0.25	0.303	0.36	0.423	0.49
1 AU (w accel & decel)	27.917	14.167	9.676	7.5	6.25	5.463	4.941	4.583	4.336	4.167	4.053	3.982	3.942	3.929
600g accel /deccel time	0.07	0.14	0.21	0.28	0.35	0.42	0.49	0.56	0.63	0.69	0.76	0.83	0.9	0.97
Au Travelled	0.001	0.005	0.011	0.02	0.031	0.045	0.061	0.08	0.101	0.125	0.151	0.18	0.211	0.245
1 AU (w accel & decel)	27.847	14.028	9.468	7.222	5.903	5.046	4.454	4.028	3.711	3.472	3.289	3.148	3.040	2.956
900g accel /deccel time	0.05	0.09	0.14	0.19	0.23	0.28	0.32	0.37	0.42	0.46	0.51	0.56	0.6	0.65
Au Travelled	0.001	0.003	0.008	0.013	0.021	0.03	0.041	0.053	0.068	0.083	0.101	0.12	0.141	0.163
1 AU (w accel & decel)	27.824	13.982	9.398	7.130	5.787	4.907	4.292	3.843	3.503	3.241	3.035	2.870	2.739	2.632

Table 1.6 The Solar System Distances Table

World	Mercury	Venus	Earth (& Luna)	Mars	Asteroid Belt – Ceres	Asteroid Belt – Pallas	Asteroid Belt – Vesta	Asteroid Belt – Juno	Asteroid Belt – Hygeia	Jupiter (and Trojans)	Saturn	Uranus	Neptune	Pluto	Tintamar / Portal
Distance from Sol	0.39	0.72	1	1.52	2.77	2.77	2.36	2.67	3.14	5.2	9.54	19.35	30.11	39.78	2.5
Mercury – Near	0	0.33	0.61	1.13	2.38	2.38	1.97	2.28	2.75	4.81	9.15	18.96	29.72	39.39	2.11
Mercury – Far	0	1.11	1.39	1.91	3.16	3.16	2.75	3.06	3.53	5.59	9.93	19.74	30.5	40.17	2.89
Venus – Near	0.33	0	0.28	0.8	2.05	2.05	1.64	1.95	2.42	4.48	8.82	18.63	29.39	39.06	1.78
Venus – Far	1.11	0	1.72	2.24	3.49	3.49	3.08	3.39	3.86	5.92	10.26	20.07	30.83	40.5	3.22
Earth & Luna – Near	0.61	0.28	0	0.52	1.77	1.77	1.36	1.67	2.14	4.2	8.54	18.35	29.11	38.78	1.5
Earth & Luna – Far	1.39	1.72	2	2.52	3.77	3.77	3.36	3.67	4.14	6.2	10.54	20.35	31.11	40.78	3.5
Mars – Near	1.13	0.8	0.52	0	1.25	1.25	0.84	1.15	1.62	3.68	8.02	17.83	28.59	38.26	0.98
Mars – Far	1.91	2.24	2.52	0	4.29	4.29	3.88	4.19	4.66	6.72	11.06	20.87	31.63	41.3	4.02
Ceres – Near	2.38	2.05	1.77	1.25	0	0	0.41	0.1	0.37	2.43	6.77	16.58	27.34	37.01	0.27
Ceres – Far	3.16	3.49	3.77	4.29	0	5.54	5.13	5.44	5.91	7.97	12.31	22.12	32.88	42.55	5.27
Pallas – Near	2.38	2.05	1.77	1.25	0	0	0.41	0.1	0.37	2.43	6.77	16.58	27.34	37.01	0.27
Pallas – Far	3.16	3.49	3.77	4.29	5.54	0	5.13	5.44	5.91	7.97	12.31	22.12	32.88	42.55	5.27
Vesta – Near	1.97	1.64	1.36	0.84	0.41	0.41	0	0.31	0.78	2.84	7.18	16.99	27.75	37.42	0.14
Vesta – Far	2.75	3.08	3.36	3.88	5.13	5.13	0	5.03	5.5	7.56	11.9	21.71	32.47	42.14	4.86
Juno – Near	2.28	1.95	1.67	1.15	0.1	0.1	0.31	0	0.47	2.53	6.87	16.68	27.44	37.11	0.17
Juno – Far	3.06	3.39	3.67	4.19	5.44	5.44	5.03	0	5.81	7.87	12.21	22.02	32.78	42.45	5.17
Hygeia – Near	2.75	2.42	2.14	1.62	0.37	0.37	0.78	0.47	0	2.06	6.4	16.21	26.97	36.64	0.64
Hygeia – Far	3.53	3.86	4.14	4.66	5.91	5.91	5.5	5.81	0	8.34	12.68	22.49	33.25	42.92	5.64
Jupiter & Trojans (near)	4.81	4.48	4.2	3.68	2.43	2.43	2.84	2.53	2.06	0	4.34	14.15	24.91	34.58	2.7
Jupiter & Trojans (far)	5.59	5.92	6.2	6.72	7.97	7.97	7.56	7.87	8.34	0	14.74	24.55	35.31	44.98	7.7
Saturn – near	9.15	8.82	8.54	8.02	6.77	6.77	7.18	6.87	6.4	4.34	0	9.81	20.57	30.24	7.04
Saturn – far	9.93	10.26	10.54	11.06	12.31	12.31	11.9	12.21	12.68	14.74	0	28.89	39.65	49.32	12.04
Uranus – near	18.96	18.63	18.35	17.83	16.58	16.58	16.99	16.68	16.21	14.15	9.81	0	10.76	20.43	16.85
Uranus – far	19.74	20.07	20.35	20.87	22.12	22.12	21.71	22.02	22.49	24.55	28.89	0	49.46	59.13	21.85
Neptune – near	29.72	29.39	29.11	28.59	27.34	27.34	27.75	27.44	26.97	24.91	20.57	10.76	0	9.67	27.61
Neptune – far	30.5	30.83	31.11	31.63	32.88	32.88	32.47	32.78	33.25	35.31	39.65	49.46	0	69.89	32.61
Pluto – near	39.39	39.06	38.78	38.26	37.01	37.01	37.42	37.11	36.64	34.58	30.24	20.43	9.67	0	37.28
Pluto – far	40.17	40.5	40.78	41.3	42.55	42.55	42.14	42.45	42.92	44.98	49.32	59.13	69.89	0	42.28
Tintamar/Sol Portal - near	2.11	1.78	1.5	0.98	0.27	0.27	0.14	0.17	0.64	2.7	7.04	16.85	27.61	37.28	0
Tintamar/Sol Portal – far	2.89	3.22	3.5	4.02	5.27	5.27	4.86	5.17	5.64	7.7	12.04	21.85	32.61	42.28	0

Earth-Moon 0.003   Jupiter-Trojan 5.2   Trojan-Trojan 8.66

The Lagrange Drive can only be used in the Lagrange Points formed by the two largest bodies in a solar system, e.g. the Sun and Jupiter in the Solar System. All other Lagrange Points are too unsafe due to the gravitational action of the largest planet in the system – attempts to use the Lagrange Drive in those other points simply destroy the ship.

Starships use the major L5 point to exit a solar system with the Lagrange Drive. By expending a considerable amount of energy, the ship is surrounded by a protective field and instantaneously shifted into a hyperspace dimension. In this dimension, the ship travels at a hyper-velocity of 1 light-year per day, before exiting at the major L4 point of the destination solar system. The destination is set as the spacecraft enters hyperspace, and the energy is expended to create the field at that point. Thus even if a ship's engines fail in hyperspace, the ship will still leave hyperspace safely.

In the Solar System, the L4 and L5 points of Jupiter are also known as the Leading and Trailing Trojan points. Each is home to several thousand small asteroids. Players are warned that exiting

hyperspace at high velocity into a miniature asteroid field is extremely foolish, and doubly so when the destination has never been explored before.

In multiple star systems, there can be more than one set of usable Lagrange Points. These points are formed by the pairings of the individual stars with their largest orbiting planets. In some cases where a much smaller secondary star orbits a larger primary star, an additional set of suitable Lagrange Points will be found.

SysOps and players are reminded that the hyperspatial Lagrange Points are not stationary – they lead and follow the position of the smaller body of the Lagrange pair as it orbits its star. Note also that a star without a solar system cannot have hyperspatial Lagrange Points, so if a group really wants to visit that star, they'll have to get there by slower-than-light transportation.

In addition to the standard Lagrange Drive, ancient artifacts known as portals constructed by a now-vanished race named the Builders provide another means of faster-than-light travel. The portals are cylindrical in shape, immobile, made of some unknown material that resists analysis and is seemingly indestructible, and have an aperture at each end. Two types of portals have been discovered so far: lesser portals approximately 500 meters along their length axis with apertures 50 meters in diameter, and greater portals approximately 1km along their length axis with apertures 75 meters in diameter. The portal dimensions restrict the size of starships that can use them.

A starship, which sends a properly encoded pulse of gravity waves (giving the destination), can switch on its Lagrange Drive as it enters one end of the portal. It will then be transferred into a hyperspace dimension where it will move at a hypervelocity of 1 light-year per minute. On completing the transit, the spacecraft will exit into normal space from either the other aperture of another portal or the L4 point of the destination solar system. One aperture of each portal is solely for entering hyperspace; the other is solely for exiting hyperspace. Lesser portals have a maximum range of 500 light-years. Greater portals are capable of moving ships to any major L4 point or other portal anywhere in the galaxy.

The gravity wave pulses used in portal transits are equivalent to the modulations of the Lagrange Drive necessary for setting the destinations for normal hyperspatial travel. Extra signals must be added to the pulses if a starship is to exit via a portal in the destination system rather than via the L4 point. However none of the known civilizations have any means of determining in advance if there is a portal in the destination system. Fortunately the Builders appear to have anticipated this problem – if a starship attempts to exit via a non-existent portal, it will instead exit through the principal L4 point of the target system. If the target system has neither portal nor hyperspatial Lagrange Points, the starship will end up in the nearest solar system. (If a starship attempts to travel via normal Lagrange Drive to a destination lacking hyperspatial Lagrange Points, the starship will arrive in the L4 point of the nearest solar system to the intended destination.)

Translight Survey, a human-owned megacorporation, has an ambitious research program to map all the portals within a thousand light-years of Earth. They send cheap unmanned probes through the Sol portal to target stars. On arrival, the probes perform a basic scan of the new solar system before heading for home by portal (if there is one) or by normal Lagrange Drive (if not). Translight Survey has discovered only one portal so far using this technique but they are accumulating a substantial database of potential worlds for further exploration and exploitation.

Table 1.7 The Planetary Locations Table		
Planet	Coords	System
Arenac	330, 31, -15	
Behnva	371, 22, -16	
Churchill	-25.65, 2.13, 17.49	61 Ursae Majoris
Coirilon Belt	434, -67, +15	Coirilon
Dalaosiss	310, 43, 10	
Earth	0,0,0	Sol
Eden	29.03, -18.8, -37.48	Henry Draper 207129
El Dorado	49.41, 40.01, -27.67	Hipparcos 12110
Elysium	53.18, 38.12, -28.88	Kappa Fornacis
Franklin	-4.79, 10.31, 1.06	Procyon A
Freiland	-35.8, 20.46, 25.69	20 Leonis Minoris
Gilgamesh	10.28, 5.02, -3.27	Tau Ceti
Herandilon Belt	430, -27, -31	
Itanoc	348, 14, -8	
Ituvna	422, 16, 21	
Ji'hadra'ji	386, -85, -16	
Ji'mad'ji	466, -43, -15	Ji'mar'an
Ji'mal'ro	477, 11, 19	
Ji'zel'da	438, -9, 7	
Khayyam / Saladin	-35.55, 1.55, 1.10	Alaraph
Kyranoc	345, 26, 6	
Lincoln	-0.39, 8.7, -31.93	Alpha Mensae
Loki	-1.69, -1.37, -3.89	Alpha Centauri A
Mbingu	-15.19, -14.04, 7.2	Xi Bootis A
Meiji	7.9, 24.78, 3.24	Pi Orionis
New Albion	12.91, 39.49, -12.65	58 Eridani
Newton / Darwin	4.28, -6.81, -18.22	Delta Pavonis
Nexus	398, -23, 32	Nexus
Pasteur / Napoleon	26.21, 32.1, -49.38	Hipparcos 15774
Poseidon / Demeter	-24.92, -8.86, -8.79	61 Virginis
Radisiss	355, 70, -1	
Ranoc	332, 17, -16	Maroc
Saroulsiss, Solunsiss	315, 90, 11	Serasilisi
Shangri-La / Xanadu	-2.99, 49.71, -22.03	Hipparcos 29568
Siva	410, 37, -9	Reshta
Takhna	427, 69, -10	
Talansiss	380, 115, 17	
Tamazek	346, -40, 2	Farazek
Valhalla	2.56, -6.01, 17.64	Sigma Draconis
Washington	10.12, 2.2, 16.45	Eta Cassiopeiae A

Table 1.8 The Interstellar Transit Table

Planet	Arenac	Behnva	Churchill	Coirilon	Dalaosiss	Earth	Eden	El Dorado	Elysium	Franklin	Freiland	Gilgamesh	Herandilon	Itanoc	Ituvna	Ji'hadra'ji	Ji'mad'ji	Ji'mal'ro	Ji'zel'da	Khayyam / Saladin
Arenac	0.0	42.0	358.3	146.0	34.2	331.8	305.9	281.0	277.3	335.8	368.2	321.0	116.7	25.7	99.9	128.8	154.8	152.2	117.3	367.1
Behnva	42.0	0.0	398.6	113.4	69.6	372.0	345.1	322.3	318.5	376.4	408.9	361.3	78.2	25.6	63.3	108.1	115.1	112.2	77.3	407.4
Churchill	358.3	398.6	0.0	464.8	338.2	31.1	80.3	95.4	98.3	27.8	22.5	41.6	459.2	374.7	447.9	422.1	494.8	502.7	463.9	19.2
Coirilon Belt	146.0	113.4	464.8	0.0	165.8	439.4	411.2	401.5	397.5	445.8	478.0	430.2	61.1	120.4	84.1	59.9	50.0	89.2	58.7	474.7
Dalaosiss	34.2	69.6	338.2	165.8	0.0	313.1	291.6	263.3	259.8	316.6	346.9	302.4	144.9	51.1	115.7	151.1	179.9	170.3	138.2	348.1
Earth	331.8	372.0	31.1	439.4	313.1	0.0	51.0	69.3	71.5	11.4	48.6	11.9	432.0	348.4	422.8	395.6	468.2	477.5	438.2	35.6
Eden	305.9	345.1	80.3	411.2	291.6	51.0	0.0	63.0	62.4	59.0	98.7	45.7	401.1	322.0	398.8	363.7	438.2	452.5	411.5	77.9
El Dorado	281.0	322.3	95.4	401.5	263.3	69.3	63.0	0.0	4.4	68.2	102.4	57.9	386.5	300.4	376.5	359.2	425.0	431.1	393.2	97.6
Elysium	277.3	318.5	98.3	397.5	259.8	71.5	62.4	4.4	0.0	70.9	105.9	59.9	382.4	296.5	372.8	355.1	420.9	427.4	389.4	100.5
Franklin	335.8	376.4	27.8	445.8	316.6	11.4	59.0	68.2	70.9	0.0	40.9	16.6	437.6	352.9	427.3	402.6	474.1	482.1	443.3	32.0
Freiland	368.2	408.9	22.5	478.0	346.9	48.6	98.7	102.4	105.9	40.9	0.0	56.6	471.6	385.3	457.9	436.8	507.4	512.9	475.1	31.0
Gilgamesh	321.0	361.3	41.6	430.2	302.4	11.9	45.7	57.9	59.9	16.6	56.6	0.0	421.9	337.9	412.6	386.6	458.4	467.3	428.1	46.2
Herandilon Belt	116.7	78.2	459.2	61.1	144.9	432.0	401.1	386.5	382.4	437.6	471.6	421.9	0.0	94.5	68.0	74.3	42.5	78.4	42.8	467.5
Itanoc	25.7	25.6	374.7	120.4	51.1	348.4	322.0	300.4	296.5	352.9	385.3	337.9	94.5	0.0	79.5	106.3	131.2	131.8	94.1	383.9
Ituvna	99.9	63.3	447.9	84.1	115.7	422.8	398.8	376.5	372.8	427.3	457.9	412.6	68.0	79.5	0.0	113.4	81.9	55.3	32.8	458.2
Ji'hadra'ji	128.8	108.1	422.1	59.9	151.1	395.6	363.7	359.2	355.1	402.6	436.8	386.6	74.3	106.3	113.4	0.0	90.4	136.8	94.9	430.7
Ji'mad'ji	154.8	115.1	494.8	50.0	179.9	468.2	438.2	425.0	420.9	474.1	507.4	458.4	42.5	131.2	81.9	90.4	0.0	64.8	49.2	503.8
Ji'mal'ro	152.2	112.2	502.7	89.2	170.3	477.5	452.5	431.1	427.4	482.1	512.9	467.3	78.4	131.8	55.3	136.8	64.8	0.0	45.4	513.0
Ji'zel'da	117.3	77.3	463.9	58.7	138.2	438.2	411.5	393.2	389.4	443.3	475.1	428.1	42.8	94.1	32.8	94.9	49.2	45.4	0.0	473.7
Khayyam / Saladin	367.1	407.4	19.2	474.7	348.1	35.6	77.9	97.6	100.5	32.0	31.0	46.2	467.5	383.9	458.2	430.7	503.8	513.0	473.7	0.0
Kyranoc	26.3	34.3	371.6	129.0	39.1	346.0	322.1	297.8	294.2	350.2	381.4	335.5	106.8	18.7	79.1	120.4	140.9	133.5	99.4	381.4
Lincoln	331.6	372.0	55.9	443.4	315.1	33.1	40.7	59.0	61.2	33.3	68.7	30.8	431.9	349.3	425.8	397.9	469.6	480.1	440.5	48.8
Loki	333.5	373.6	32.3	441.0	315.1	4.5	48.7	69.9	72.1	13.1	50.2	13.6	433.3	350.1	424.8	396.8	469.7	479.4	439.9	34.4
Mbingu	348.8	388.6	21.8	452.4	330.2	21.9	63.0	91.2	93.3	27.2	44.2	33.5	447.0	364.6	438.4	408.1	482.6	493.0	453.2	26.4
Meiji	322.7	363.6	42.9	436.0	302.7	26.2	63.3	54.0	57.1	19.4	49.3	20.9	426.6	340.5	414.6	394.2	463.5	469.6	431.4	49.3
New Albion	317.2	358.5	61.6	435.2	298.0	43.4	65.4	39.5	43.4	36.8	64.8	35.8	422.8	336.1	411.1	393.3	460.5	466.0	428.3	63.1
Newton / Darwin	327.9	367.9	47.4	435.2	311.0	19.9	33.6	65.7	67.3	27.3	65.4	20.0	426.4	344.5	420.2	389.7	463.2	474.5	434.5	45.1
Nexus	98.7	71.1	424.6	59.3	112.2	400.0	375.5	359.2	355.5	405.4	436.0	390.3	70.8	74.0	47.1	79.3	85.1	87.0	49.2	435.3
Pasteur / Napoleon	305.7	346.6	89.8	424.6	290.1	64.5	52.4	32.7	34.4	63.1	98.1	55.8	408.5	324.9	402.3	379.8	447.5	456.4	417.7	85.4
Poseidon / Demeter	357.2	397.2	28.5	463.2	339.4	27.9	61.9	90.9	93.3	29.5	46.6	38.2	455.8	373.6	448.6	418.0	492.1	503.1	463.2	17.9
Radisiss	48.4	52.8	387.1	159.0	53.6	361.8	339.8	308.2	304.8	364.7	394.8	350.8	126.2	56.9	88.8	158.8	159.0	137.0	114.9	396.5
Ranoc	14.2	39.3	359.5	135.7	42.9	332.8	305.8	283.8	279.9	337.3	370.2	322.2	108.5	18.1	97.3	115.4	146.8	149.3	111.5	368.3
Saroulsiss, Solunsiss	66.2	92.1	351.9	197.0	47.3	327.8	309.8	273.0	269.9	329.7	357.9	316.7	169.4	85.0	130.5	190.8	202.9	180.4	157.9	361.7
Shangri-La / Xanadu	333.6	375.1	65.9	453.8	314.7	54.5	77.2	53.3	57.8	45.7	64.9	50.3	439.8	353.1	428.5	411.7	478.1	483.3	445.8	62.6
Siva	80.5	42.4	437.9	109.4	102.0	411.8	386.1	361.1	357.4	415.8	447.5	401.0	70.6	66.1	38.5	124.5	97.8	77.1	56.2	447.1
Takhna	104.3	73.4	458.4	138.5	121.5	432.7	408.5	379.1	375.6	435.9	466.7	421.7	98.3	96.3	61.6	159.5	118.7	81.9	80.6	467.6
Talansiss	102.9	99.1	421.1	189.9	100.7	397.4	379.5	341.9	338.9	399.1	426.5	386.3	158.0	108.9	107.6	202.8	182.7	142.2	137.3	431.1
Tamazek	74.7	69.2	374.4	93.0	90.8	348.3	320.1	308.6	304.6	354.4	387.3	338.8	91.2	55.0	96.3	62.8	121.2	141.6	97.2	383.8
Valhalla	331.1	371.0	29.4	435.7	311.4	18.8	62.5	79.8	81.7	24.4	47.3	24.9	430.7	347.0	420.0	392.9	466.1	474.8	435.6	42.2
Washington	322.7	362.9	35.8	429.5	302.7	19.4	60.9	70.1	72.1	22.9	50.3	19.9	423.6	339.0	412.1	387.2	459.2	467.0	428.1	48.2

Table 1.8 The Interstellar Transit Table

Kyranoc	Lincoln	Loki	Mbingu	Meiji	New Albion	Newton / Darwin	Nexus	Pasteur / Napoleon	Poseidon / Demeter	Radisiss	Ranoc	Saroulsiss, Solunsiss	Shangri-La / Xanadu	Siva	Takhna	Talansiss	Tamazek	Valhalla	Washington	Planet
26.3	331.6	333.5	348.8	322.7	317.2	327.9	98.7	305.7	357.2	48.4	14.2	66.2	333.6	80.5	104.3	102.9	74.7	331.1	322.7	Arenac
34.3	372.0	373.6	388.6	363.6	358.5	367.9	71.1	346.6	397.2	52.8	39.3	92.1	375.1	42.4	73.4	99.1	69.2	371.0	362.9	Behnva
371.6	55.9	32.3	21.8	42.9	61.6	47.4	424.6	89.8	28.5	387.1	359.5	351.9	65.9	437.9	458.4	421.1	374.4	29.4	35.8	Churchill
129.0	443.4	441.0	452.4	436.0	435.2	435.2	59.3	424.6	463.2	159.0	135.7	197.0	453.8	109.4	138.5	189.9	93.0	435.7	429.5	**Coirilon Belt**
39.1	315.1	315.1	330.2	302.7	298.0	311.0	112.2	290.1	339.4	53.6	42.9	47.3	314.7	102.0	121.5	100.7	90.8	311.4	302.7	Dalaosiss
346.0	33.1	4.5	21.9	26.2	43.4	19.9	400.0	64.5	27.9	361.8	332.8	327.8	54.5	411.8	432.7	397.4	348.3	18.8	19.4	***Earth***
322.1	40.7	48.7	63.0	63.3	65.4	33.6	375.5	52.4	61.9	339.8	305.8	309.8	77.2	386.1	408.5	379.5	320.1	62.5	60.9	**Eden**
297.8	59.0	69.9	91.2	54.0	39.5	65.7	359.2	32.7	90.9	308.2	283.8	273.0	53.6	361.1	379.1	341.9	308.6	79.8	70.1	**El Dorado**
294.2	61.2	72.1	93.3	57.1	43.4	67.3	355.5	34.4	93.3	304.8	279.9	269.9	57.8	357.4	375.6	338.9	304.6	81.7	72.1	Elysium
350.2	33.3	13.1	27.2	19.4	36.8	27.3	405.4	63.1	29.5	364.7	337.3	329.7	45.7	415.8	435.9	399.1	354.4	24.4	22.9	Franklin
381.4	68.7	50.2	44.2	49.3	64.8	65.4	436.0	98.1	46.6	394.8	370.2	357.9	64.9	447.5	466.7	426.5	387.3	47.3	50.3	**Freiland**
335.5	30.8	13.6	33.5	20.9	35.8	20.0	390.3	55.8	38.2	350.8	322.2	316.7	50.3	401.0	421.7	386.3	338.8	24.9	19.9	Gilgamesh
106.8	431.9	433.3	447.0	426.6	422.8	426.4	70.8	408.5	455.8	126.2	108.5	169.4	439.8	70.6	98.3	158.0	91.2	430.7	423.6	Herandilon Belt
18.7	349.3	350.1	364.6	340.5	336.1	344.5	74.0	324.9	373.6	56.9	18.1	85.0	353.1	66.1	96.3	108.9	55.0	347.0	339.0	Itanoc
79.1	425.8	424.8	438.4	414.6	411.1	420.2	47.1	402.3	448.6	88.8	97.3	130.5	428.5	38.5	61.6	107.6	96.3	420.0	412.1	Ituvna
120.4	397.9	396.8	408.1	394.2	393.3	389.7	79.3	379.8	418.0	158.8	115.4	190.8	411.7	124.5	159.5	202.8	62.8	392.9	387.2	Ji'hadra'ji
140.9	469.6	469.7	482.6	463.5	460.5	463.2	85.1	447.5	492.1	159.0	146.8	202.9	478.1	97.8	118.7	182.7	121.2	466.1	459.2	***Ji'mad'ji***
133.5	480.1	479.4	493.0	469.6	466.0	474.5	87.0	456.4	503.1	137.0	149.3	180.4	483.3	77.1	81.9	142.2	141.6	474.8	467.0	Ji'mal'ro
99.4	440.5	439.9	453.2	431.4	428.3	434.5	49.2	417.7	463.2	114.9	111.5	157.9	445.8	56.2	80.6	137.3	97.2	435.6	428.1	Ji'zel'da
381.4	48.8	34.4	26.4	49.3	63.1	45.1	435.3	85.4	17.9	396.5	368.3	361.7	62.6	447.1	467.6	431.1	383.8	42.2	48.2	**Khayyam / Saladin**
0.0	347.9	347.9	362.4	337.1	332.9	343.2	76.7	323.6	371.9	45.7	27.1	70.9	349.9	67.6	94.0	96.3	66.1	344.1	335.9	Kyranoc
347.9	0.0	29.8	47.6	39.6	38.7	21.2	404.7	39.5	38.0	362.0	332.9	328.5	42.3	412.0	432.2	398.0	351.4	51.8	49.9	Lincoln
347.9	29.8	0.0	21.6	28.8	44.3	16.5	401.9	63.0	24.9	363.8	334.4	329.9	54.2	413.5	434.5	399.6	349.9	22.4	23.8	Loki
362.4	47.6	21.6	0.0	45.3	63.6	32.8	414.0	83.9	19.4	379.7	349.4	346.2	71.2	428.6	450.3	415.8	362.2	22.1	31.5	Mbingu
337.1	39.6	28.8	45.3	0.0	22.2	38.4	394.1	56.2	48.5	350.1	324.8	314.1	37.1	402.5	421.6	383.1	344.3	34.4	26.3	Meiji
332.9	38.7	44.3	63.6	22.2	0.0	47.4	392.7	39.8	61.5	343.7	319.9	307.2	21.1	397.1	415.2	376.0	342.8	55.6	47.4	New Albion
343.2	21.2	16.5	32.8	38.4	47.4	0.0	397.2	54.5	30.8	359.5	328.6	326.8	57.1	408.2	429.5	396.5	343.9	35.9	36.3	***Newton / Darwin***
76.7	404.7	401.9	414.0	394.1	392.7	397.2	0.0	384.6	425.1	107.6	90.9	141.8	411.1	73.7	105.2	140.0	62.4	396.1	389.0	Nexus
323.6	39.5	63.0	83.9	56.2	39.8	54.5	384.6	0.0	77.1	334.5	308.0	300.7	43.7	385.9	404.4	369.4	331.8	80.6	74.1	**Pasteur / Napoleon**
371.9	38.0	24.9	19.4	48.5	61.5	30.8	425.1	77.1	0.0	388.1	357.9	354.6	63.9	437.3	458.6	424.2	372.4	38.2	44.6	***Poseidon / Demeter***
45.7	362.0	363.8	379.7	350.1	343.7	359.5	107.6	334.5	388.1	0.0	59.7	46.3	359.2	64.6	72.6	54.5	110.4	361.0	351.9	Radisiss
27.1	332.9	334.4	349.4	324.8	319.9	328.6	90.9	308.0	357.9	59.7	0.0	79.7	336.6	80.8	108.5	114.0	61.4	332.0	323.9	***Ranoc***
70.9	328.5	329.9	346.0	314.1	307.2	326.8	141.8	300.7	354.6	46.3	79.7	0.0	322.2	110.6	115.9	69.9	134.0	326.9	317.3	**Saroulsiss, Solunsiss**
349.9	42.3	54.2	71.2	37.1	21.1	57.1	411.1	43.7	63.9	359.2	336.6	322.2	0.0	413.4	430.6	390.5	361.1	68.6	62.5	**Shangri-La / Xanadu**
67.6	412.0	413.5	428.6	402.5	397.1	408.2	73.7	385.9	437.3	64.6	80.8	110.6	413.4	0.0	36.3	87.5	100.7	410.6	402.2	***Siva***
94.0	432.2	434.5	450.3	421.6	415.2	429.5	105.2	404.4	458.6	72.6	108.5	115.9	430.6	36.3	0.0	71.1	136.3	431.9	423.0	Takhna
96.3	398.0	399.6	415.8	383.1	376.0	396.5	140.0	369.4	424.2	54.5	114.0	69.9	390.5	87.5	71.1	0.0	159.4	396.4	386.7	Talansiss
66.1	351.4	349.9	362.2	344.3	342.8	343.9	62.4	331.8	372.4	110.4	61.4	134.0	361.1	100.7	136.3	159.4	0.0	345.5	338.8	***Tamazek***
344.1	51.8	22.4	22.1	34.4	55.6	35.9	396.1	80.6	38.2	361.0	332.0	326.9	68.6	410.6	431.9	396.4	345.5	0.0	11.2	***Valhalla***
335.9	49.9	23.8	31.5	26.3	47.4	36.3	389.0	74.1	44.6	351.9	323.9	317.3	62.5	402.2	423.0	386.7	338.8	11.2	0.0	Washington

❂ Tintamar Knowledge Base: The Solar Portal and Tintamar

In 2464, a greater portal was found in the Asteroid Belt of the Solar System. Following the Silth incursion of 2465 into Sol system, this portal is now protected by a cadre of Federation superdreadnoughts and vessels assigned from the navies of the Martian Republic and the Belter League. (Naval squadrons from the Jovian Confederacy supported by Federation craft guard Jupiter's Trojan points.) Federation dreadnoughts and/or colonial units are responsible for the other nine portals in human space.

Tintamar orbits one thousand kilometers away from the Sol portal. Originally intended to become a bubble-world habitat, the Tintamar asteroid was redesigned into a cylindrical space station some 10km long and 1km in radius. The surface is reserved for sensor arrays, weapons grids, solar collectors, and docking ports for ships. Portions of the asteroid have been honeycombed with rooms and tunnels for control stations, offices, mini-factories, and living quarters for aliens requiring special environments. Other parts of Tintamar have been hollowed out to form large caverns where a range of Earth-normal climates are simulated. Gravity is generated artificially.

The vast majority of Terran commerce with the Nexus sector is routed through the Sol portal via the Tintamar station. It is also the jumping off point for explorer teams heading into the Nexus Sector or beyond, and usually the first port of call on their return for much needed rest and recreation. Tintamar is responsible for all traffic using the Sol portal – including collecting the fees for portal use. Failure to obey the instructions of Tintamar space control, especially on arrival in Sol system, will invite swift annihilation from the naval defenders. They take the safety of the billions who live on Earth and in the solar colonies very seriously.

❂ Tintamar Knowledge Base: Portal Mysteries

The distribution of portals across the known galaxy seems to follow no clear pattern. However, there is a theory that the Builders constructed portals in solar systems where there was a high probability of a technological civilization arising. The evidence for this is circumstantial. Cerans, Humans, Gorsiva, Krakuren, and Madji all have portals in the solar systems of their homeworlds; the Runcori claim their home system to be lost. Several of the other portals in human space are in systems where the indigenous civilization has become extinct. Opponents of the theory note the presence of portals in systems without even primitive sophonts. The wilder proponents claim that perhaps sentience has yet to arise on those worlds. Federation strategists worry about whether the Silth have a portal in their neighborhood.

The portals are both a great boon and a grave peril. They give sentients an extremely fast means of traveling around the galaxy, but none of the younger species have any way of predicting or preventing unwanted visitors coming through a portal. In 2472, a portal with a closed incoming aperture was located in a system midway between human space and the Nexus Sector. Its existence and position is a Federation secret as is the research station that has been established there to discover how to open and close the apertures.

❂ Tintamar Knowledge Base: Planetary Locations and Transit Times

Three tables are presented in this section.

The Planetary Locations Table (Table 1.7) lists all the key worlds named in the HARP SF rulebook and gives the coordinates of their star relative to Sol and the present-day name of their star. Worlds in Bold are described in the HARP SF rulebook, those in Bold Italics also have a portal somewhere in their solar system.

The Interstellar Transit Table (Table 1.8) can be used to read out the distance in light-years between the stars of named worlds. To determine the distance in light-years between two systems, cross-reference the "Departure World" with the "Destination". Travel by Lagrange Drive is 1 light-year per day; travel by portal is 1 light-year per minute. Worlds in Bold are described in the HARP SF rulebook, those in Bold Italics also have a portal somewhere in their solar system. Note that this table does not include any interplanetary space travel from departure worlds via entry/exit points and portals to destination worlds.

The Extrasolar Transit Table (Table 1.9) provides transit distances between key locations in other solar systems, specifically distances from hyperspatial points and portals to inhabited worlds and vice versa. Worlds marked with an asterisk are the gas giants whose Trojan points form the hyperspatial entry and exit points. The distance between entry and exit points is also given on the table. The table only provides cosmographical data for the systems detailed in the HARP SF rulebook.

❂ SysOp's Tip: Distance from L4 to L5

Sometimes the most sensible thing that a party can do on arrival in a strange solar system is to leave as quickly as possible. The distance between the entry Lagrange Point (L4) and the exit Lagrange Point (L5) becomes crucial in such situations. If R is the distance of the largest body in a solar system from its sun, then the straight-line distance between L4 and L5 equals 2 x 0.866 x R. For example in our own solar system, Jupiter is on average 5 au from Sol, so the L4 to L5 distance is 8.66 au (2 x 0.866 x 5 au).

❂ SysOp's Tip: Interstellar Distances

Table 1.8 will be helpful to SysOps needing to know how long it will take a starship to travel between the named systems. For other systems, the SysOp can calculate the distance using a three-dimensional extension of Pythagoras' Theorem. The coordinates of both source and destination system must be known in the same coordinate system (either equatorial celestial coordinates or galactic celestial coordinates). Then simply plug the x, y, and z coordinates into the formula below:

$$\text{Distance} = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2 + (z_1 - z_2)^2}$$

Table 1.9 The Extrasolar Transit Table

Planet	Entry to Exit													
Coirilon Belt	9.526		From Star	Bucdari – near	Bucdari – far	Talavi – near	Talavi – far	Odiparon – near	Odiparon – far	Gadisaro -near	Gadisaro – far	Hendaris – near	Hendaris – far	Coiri – near	Coiri – far
		Bucdari	0.8	0	0	0.1	1.7	0.4	2	0.7	2.3	1	2.6	4.7	6.3
		Talavi	0.9	0.1	1.7	0	0	0.3	2.1	0.6	2.4	0.9	2.7	4.6	6.4
		Odiparon	1.2	0.4	2	0.3	2.1	0	0	0.3	2.7	0.6	3	4.3	6.7
		Gadisaro	1.5	0.7	2.3	0.6	2.4	0.3	2.7	0	0	0.3	3.3	4	7
		Hendaris	1.8	1	2.6	0.9	2.7	0.6	3	0.3	3.3	0	0	3.7	7.3
		Coiri (*)	5.5	4.7	6.3	4.6	6.4	4.3	6.7	4	7	3.7	7.3	0	0
Eden	133.710		From Star	Eden – near	Eden – far	Leviathan -near	Leviathan – far								
		Eden	1	0	0	76.2	78.2								
		Leviathan (*)	77.2	76.2	78.2	0	0								
El Dorado	2.598		From Star	El Dorado – near	El Dorado – far	Isabella – near	Isabella – far								
		El Dorado	0.6	0	0	0.9	2.1								
		Isabella (*)	1.5	0.9	2.1	0	0								
Freiland	1.386		From Star	Amadeus – near	Amadeus – far	Freiland -near	Freiland – far								
		Amadeus (*)	0.8	0	0	0.3	1.9								
		Freiland	1.1	0.3	1.9	0	0								
Ji'mad'ji	11.258			Ji'mad'ji – near	Ji'mad'ji – far	Ji'tan'ji – near	Ji'tan'ji - far	Ji'mar'an Portal – near	Ji'mar'an Portal – far						
		Ji'mad'ji	0.1	0	0	6.4	6.6	51.2	51.4						
		Ji'tan'ji (*)	6.5	6.4	6.6	0	0	44.8	57.8						
		Ji'mar'an Portal (*)	51.3	51.2	51.4	44.8	57.8	0	0						
Khayyam / Saladin	5.716		From Star	Khayyam – near	Khayyam – far	Saladin – near	Saladin – far	Suleiman – near	Suleiman – far						
		Khayyam	1.5	0	0	0.6	3.6	1.8	4.8						
		Saladin	2.1	0.6	3.6	0	0	1.2	5.4						
		Suleiman (*)	3.3	1.8	4.8	1.2	5.4	0	0						
Meiji	5.542		From Star	Meiji – near	Meiji – far	Kin-kaku – near	Kin-kaku – far								
		Meiji	2	0	0	1.2	5.2								
		Kin-kaku (*)	3.2	1.2	5.2	0	0								
Newton / Darwin	5.542		From Star	Newton -near	Newton – far	Darwin – near	Darwin – far	Archimedes – near	Archimedes – far	Edison – near	Edison – far				
		Newton	1.1	0	0	0.3	2.5	2.1	4.3	18.9	21.1				
		Darwin	1.4	0.3	2.5	0	0	1.8	4.6	18.6	21.4				
		Archimedes (*)	3.2	2.1	4.3	1.8	4.6	0	0	16.8	23.2				
		Edison (portal)	20	18.9	21.1	18.6	21.4	16.8	23.2	0	0				
Nexus	1.559	Nexus (portal)	0.9												
Pasteur / Napoleon	16.800		From Star	Napoleon – near	Napoleon – far	Pasteur – near	Pasteur – far	Charlemagne – near	Charlemagne – far						
		Napoleon	0.4	0	0	0.3	1.1	9.3	10.1						
		Pasteur	0.7	0.3	1.1	0	0	9	10.4						
		Charlemagne (*)	9.7	9.3	10.1	9	10.4	0	0						

Table 1.9 The Extrasolar Transit Table

Planet	Entry to Exit											
Poseidon / Demeter	4.33		From Star	Portal – near	Portal- near	Poseidon/Demeter – near	Poseidon/Demeter – far	Cronus – near	Cronus – far			
		Portal	0.1	0	0	0.8	1	2.4	2.6			
		Poseidon-Demeter	0.9	0.8	1	0	0	1.6	3.4			
		Cronus (*)	2.5	2.4	2.6	1.6	3.4	0	0			
Ranoc	3.118		From Star	Ranoc – near	Ranoc – far	Portal – near	Portal – far	Shanoc – near	Shanoc – far			
		Ranoc	0.9	0	0	1.8	1.8	0.9	2.7			
		Maroc Portal	0.9	0	1.8	1.8	1.8	0.9	2.7			
		Shanoc (*)	1.8	0.9	2.7	0.9	2.7	0	0			
Saroulsiss, Solunsiss	17.493		From Star	Saroulsiss – near	Saroulsiss – far	Solunsiss – near	Solunsiss – far	Sismalsiss – near	Sismalsiss – far			
		Saroulsiss	0.8	0	0	0.3	1.9	9.3	10.9			
		Solunsiss	1.1	0.3	1.9	0	0	9	11.2			
		Sismalsiss (*)	10.1	9.3	10.9	9	11.2	0	0			
Shangri-La / Xanadu	9.353		From Star	Xanadu – near	Xanadu – far	Shangri-La – near	Shangri-La – far	Rupa-Loka – near	Rupa-Loka – far			
		Xanadu	0.9	0	0	0.3	2.1	4.5	6.3			
		Shangri-La	1.2	0.3	2.1	0	0	4.2	6.6			
		Rupa-Loka (*)	5.4	4.5	6.3	4.2	6.6	0	0			
Siva	10.392		From Star	Siva / Ursiva – near	Siva / Ursiva – far	Isehva / portal – near	Isehva / portal – far					
		Siva / Ursiva	1.2	0	0	4.8	7.2					
		Isehva / portal	6	4.8	7.2	0	0					
Tamazek	9.180		From Star	Delezek – near	Delezek – far	Tamazek – near	Tamazek – far	Tentacles – near	Tentacles – far	Valazek – near	Valazek – far	
		Delezek / portal	0.5	0	0	0.6	1.6	1.5	2.5	4.8	5.8	
		Tamazek	1.1	0.6	1.6	0	0	0.9	3.1	4.2	6.4	
		Tentacles (average)	2	1.5	2.5	0.9	3.1	0	0	3.3	7.3	
		Valazek	5.3	4.8	5.8	4.2	6.4	3.3	7.3	0	0	
Valhalla	8.487		From Star	Valhalla – near	Valhalla – far	Portal – near	Portal – far	Ymir – near	Ymir – far			
		Valhalla	0.7	0	0	0.6	2	4.2	5.6			
		Nibelungen Portal	1.3	0.6	2	0	0	3.6	6.2			
		Ymir (*)	4.9	4.2	5.6	3.6	6.2	0	0			

❂ SysOp's Choice: Moving at the Speed of Plot

Some SysOps and players may be reeling from the slew of equations. SysOps can choose to run their games without all the mathematics. Space missiles and other self-propelled space weapons are the trickiest part to handle without equations. SysOps can choose either to disallow such weapons or can simply roll a d10 to determine how many turns pass between missile launch and impacting the target. With space missiles duly dealt with, SysOp can use the existing rules for vehicle maneuvers, pursuit, etc., but ignore the number-crunching in favor of relative results. Space battles will then be dogfights using autocannons, laser cannons and so forth, and either by mutual arrangement (so to speak) or the consequence of a successful pursuit or failed escape.

TRANSPORT AND VEHICLES

The vehicles presented in this section should be considered standard models in the middle of the quality range for their stage of technological development. Vehicles with better (and worse!) performance will be available for a price. In terms of the differences between Early, Mature, and Advanced stages, SysOps should reduce the listed values for Shield Rating, EW Rating, and Point Defense Rating by 5 for Early technology (to a minimum of zero). For Advanced technology, SysOps should increase the listed values for Shield Rating, EW Rating, and Point Defense Rating by 5, but only where the relevant system is actually fitted. A standard Advanced groundcar is no more likely to be fitted with shields or point defenses than an average Mature groundcar.

The table below illustrates the differences in technical stages for vehicles. Note values in brackets indicate nonstandard additions to the vehicle.

Vehicle	Stage	Armor	Sh.	EW	PD	Weaponry
Gravcarrier	Early	20	5	5	None	+0 Tiny Autocannon, +0 Tiny Warhead
Gravcarrier	Mature	20	10	10	None	+0 Tiny Autocannon, +0 Tiny Warhead
Gravcarrier	Advanced	20	15	15	None	+0 Tiny Autocannon, +0 Tiny Warhead

∵ Land Vehicles

This category covers all vehicles that are primarily designed for use on a solid surface. Methods of movement include traditional wheeled and tracked vehicles relying on the friction of wheels and tracks against a surface, ground effect machines (GEM) - descendants of twentieth-century hovercraft - which float above land and sea on a cushion of air, and even gravitic vehicles that partially nullify gravity enabling them to travel several meters above the ground.

GEM Car: Larger than an ordinary groundcar, GEM cars are most commonly used for transporting passengers and/or a small amount of goods in marsh terrain. Their cushion of air is contained in a robust (but not indestructible) skirt of material, which if damaged will severely impair their maneuverability. They may be "convertibles" (partially open to the elements) or have fully enclosed interiors.

GEM Van: Using the same principles as the GEM car, GEM vans are primarily used to transport modest amounts of freight.

Gravcarrier: This is the gravitic equivalent of the armored personnel carrier and still employed as a surface troop transport. Gravcarriers can switch into a tracked wheel mode. Gravcarriers travel at altitudes of up to five meters.

Gravtank: The gravitic tank has replaced the traditional tank (with its tracked wheels) as the heavy ordnance vehicle of ground forces. Unlike most other gravitic vehicles, it still possesses wheels enabling it to employ old-fashioned propulsion when necessary. Gravtanks can rise to altitudes of up to five meters.

Gravitic Bike: The successor to the motorbike, the gravbike is a one-person open vehicle which can move at up to five meters above a surface. A second person can be carried as a pillion passenger.

Gravitic Car: Favored on most civilized worlds that don't want to create a comprehensive planetary road network, the gravcar negotiates most terrain by staying up to two meters above it.

Gravitic Chair: Normally used by individuals who wish to alleviate the effects of high-gravity, the gravitic chair can ascend up to one meter above a surface. Gravitic chairs use 1 energy unit per extra 1 g of gravity for every hour they are used in a high-gravity environment.

Gravitic Truck: The gravitic version of the wheeled truck rises no more than one meter above the terrain. Smaller and larger versions exist.

Gravitic Van: This gravitic version of the conventional van rises no more than 1 meter in altitude.

Groundcar: On heavily populated worlds, the car remains the most popular form of personal transportation for both short and medium-distance travel.

Motorbike: With its internal combustion engine replaced with a vehicle power cell, this one-person open wheeled vehicle retains its dedicated following among biker enthusiasts and urban couriers.

Trucks: Much larger than groundcars and vans, trucks are bulk surface transporters. Driver cabins can have full environmental control and integrated living quarters. Smaller and larger versions exist.

Van: Suitable for transporting passengers and/or cargo over short distances, this is a fully enclosed motorized vehicle.

⁑ Marine Vehicles

Plentiful clean energy and advances in magneto-gravitics mean that air travel has replaced most commercial maritime applications. Traditional "wet" navies are much smaller, relying on fast craft and concentrating on search-and-rescue operations. Only on waterworlds and planets with exotic oceans (such as liquid methane) are marine vehicles preeminent in exploration and defense.

Hydrofoil: These are modified speedboats, which deploy a set of hydrofoils (fins), which raise the craft out of the water, reducing friction and consequently increasing the vessel's speed. Hydrofoils can have open crew/passenger areas or fully enclosed areas. Vehicles designed for hostile environments will have environmentally controlled compartments. Hydrofoils come in a variety of sizes – yacht versions can be easily outfitted as floating homes with their own microfusion generator.

Motorboat: These high-speed watercraft can have either open or closed crew compartments. Civilian motorboats are normally used for recreational purposes; military motorboats primarily patrol coastal waters. Yacht-sized versions can double as floating homes and may have their own microfusion generators.

Submarine: These vessels are designed to operate underwater. Research submarines are relatively small and rely on vehicle power cells for their propulsion and life support, so can only remain underwater for limited periods. Exploration and military submarines are much larger and have their own microfusion generators. The limiting factor for these vessels is food supplies for the crew.

⁑ Air Vehicles

Although fusion power gave helicopters and airplanes a renewed lease of life as electric vehicles, aircraft using magneto-gravitic principles are now the norm on most worlds. (SysOps may still find airplanes and helicopters useful for less advanced civilizations and eras without magneto-gravitic technology.)

Airplanes: Normally requiring a runway for takeoff and landing, passenger and freight airplanes once ruled the skies. A variety of types exist from single-seater sports vehicles to huge jumbo jets.

Gravplane: Utilizing magneto-gravitic effects for both vertical and horizontal motion, gravplanes are used for private, commercial, and military purposes. They do not need runways. The highest performance gravplanes are capable of supersonic flight and can ascend to the outer limits of planetary atmospheres.

Helicopter: Aerial workhorses, the small footprint, nimbleness, and vertical ascent/landing capabilities have given helicopters a variety of roles. Small helicopters are primarily short-to-medium distance transports for valuable cargo and passengers; large helicopters are often used in medical evacuation situations; military helicopters provide aerial fire support and troop insertion capabilities.

⠿ Multimodal Vehicles

Multimodal vehicles are designed to operate effectively in two or more environments, typically by reconfiguring their shape and exterior mechanisms. Although larger and more expensive than single-mode vehicles, they are cheaper and easier to transport across interstellar space than multiple specialist vehicles. Their adaptability makes them prized by many exploration groups.

Aircar: A combination of groundcar and gravplane, aircars can be driven as wheeled vehicles, adjusted into gravcar mode with the wheels retracted into the chassis, or ascend to the skies as small gravplanes.

Gravwalker: This exploratory vehicle is normally operated in gravitic mode for fast travel in open terrain. For more confined terrain, four to six computer-controlled retractable legs can be deployed, enabling it to "walk" at a height of up to two meters above the ground. The personnel compartment of a gravwalker is a fully sealable and controlled environment.

Seacar: This vehicle can be driven as a gravcar on land, extend hydrofoils from its chassis to travel on water, or configure itself into a mini-submarine for underwater travel. A seacar's life support will allow its passengers to remain underwater for as long as there is power – though food may become an issue!

⠿ Space Vehicles

Except where otherwise noted, all spacecraft have their own microfusion generators. The discovery of the portals has ushered in a new era of smaller spacecraft, utilizing multimodal and interlock technologies to optimize their volumes to ensure that they can fit easily through the portal apertures.

Corvette: The Federation employs these small starships as interstellar couriers, patrol craft, scouts, and escorts. Effectively light frigates, corvettes are equally at home in atmosphere as deep space, but are too lightly armed and armored for flying in the line of battle with true frigates, destroyers and cruisers. In terms of size and shape, a corvette's main body is 75m long and 25m wide. It relies on its magneto-gravitic drive for in-atmosphere maneuvering.

Escape Pod: Carried by every spacecraft larger than a shuttle, these five-person vehicles are intended for emergency use only. They can be maneuvered by a single person or an autopilot, but have limited velocity and fuel. Life support systems can maintain a cramped existence for evacuees on recycled air and minimal rations for up to one hundred person-days.

Freighter: The cargo haulers of the galaxy, independent and corporate freighters follow the interstellar trade routes of inhabited space. Light freighters are designed for atmospheric as well as deep-space travel; medium freighters prefer to dock at space stations for cargo transfer. Both types are small enough to utilize the portals for rapid FTL transit. A light freighter is a streamlined cigar-shaped craft some 20m in diameter and 100m in length. Medium freighters are roughly cylindrical craft, 150m long and 30m wide. Freighters are lightly armed or not at all.

Maintenance Pod: Construction workers on space stations use these one-person craft extensively for external ship maintenance. The technician can maneuver slowly around a space dock and effect repairs using waldo attachments on the outside of the pod. These pods only have one day's worth of life support and cannot enter atmosphere.

Mini-shuttle: Much smaller versions of ordinary shuttles, mini-shuttles are designed for short trips only, i.e. planetary surface to orbit and vice versa, rather than extended interplanetary voyages. These streamlined teardrops are typically 6m in length and 5m in maximum width, and rely on their magneto-gravitic drive for maneuvering in atmosphere. They are unarmed vessels. Some larger models exist that can seat six to eight passengers in equally cramped conditions.

Scoutship: Lightly armed and armored, the scoutship relies on speed to evade trouble. Designed for long-range survey work and planetary landings, the (expendable) scouts are favored by

megacorporations for initial exploratory missions. In dimensions, scoutcraft have 75m long, 20m wide cigar-shaped main bodies. Large wings (50m span) can be extended from the rear of the craft. Scoutships cram control stations, crew quarters (including individual cabins), sickbay, mini-laboratories, etc., into two-fifths of the ship volume to provide sufficient space for planetary exploration vehicles and additional supplies.

Shuttle: With the exception of Earth where space elevators are the normal route to or from orbit, interplanetary shuttles move passengers and cargo between ground and orbit and between worlds. All shuttles are equipped with magneto-gravitic drives and shields, but vary according to armament and maximum velocity. Transport shuttles are the slowest and have no weapons. Courier shuttles are lightly armed but can reach 7% of lightspeed. Assault shuttles sacrifice speed for heavy weaponry and are mainly used for orbital insertion of troops onto planetary surfaces. All shuttles can provide life support for all carried personnel for up to fifty days. Modern shuttle designs use interlock technology so that they can be mated externally to starships for faster-than-light travel. Shuttles have a main cigar-shaped body with diameters from 8m (courier shuttles) to 10m (assault and transport) and longitudinal lengths from 40m (courier) to 50m (others). Box-like attachments at the rear of the shuttles can be extended into large wings (25m-30m wingspan) for improved atmospheric maneuvering.

Starfighter: These small fighter craft vary widely in size, weaponry, crew requirements (one or two persons), maximum velocity and other facilities (shields, electronic countermeasures, etc). Some are dedicated space fighters; others are equally at home in atmosphere. For interstellar travel, they are mated by interlocks to larger starships or carried on specialist carrier ships.

❽ SysOp's Note: Capital-class Vehicles

Even with portals driving spacecraft design towards smaller sizes, there are many much larger vessels still in operation across human and alien space. Battleships, dreadnoughts and superdreadnoughts are routinely deployed as sentry ships guarding portals, space stations and vital installations, where their overwhelming firepower can make short work of destroying anything smaller – unless the smaller craft come in numbers. Colonization starships, luxury space liners, tankers, and mammoth freighters haul people and material across the stars at a more leisurely pace. On some worlds, cruise liners, vast cargo transports and wet-navy ships still sail the oceans, while gravitic juggernauts make stately progressions over their landmasses.

Capital-class vehicles such as these are not covered in this volume as their larger crew complements (and indeed their inability to flit across the Tintamar universe by portal) makes them less suitable for the average group of independent freewheeling player-characters. They will be presented in the SysOp's Guide, where their use as campaign and adventure locations will also be discussed. Rules for utilising such capital vehicles in combat with normal vehicles and personnel will be covered in the next chapter.

14-Person Mini-shuttle

Communications

Flight Controls

Fuel

Thrusters

1.5 meters

Power Plant

Gravitic Nodes

Cargo Shuttle

Airlock: With extendible ramp

Cargo Area

Fuel Pumps

Fuel

Ladder: To Second Deck

Airlock Door

Airlock Door

Captains Quarters

Crew Quarters

Fuel & Power Plant

Pilot

Plasma Drive

Sensors

Navigation

Cargo Access

Small Conference Room

Engineering

Gravitic Nodes
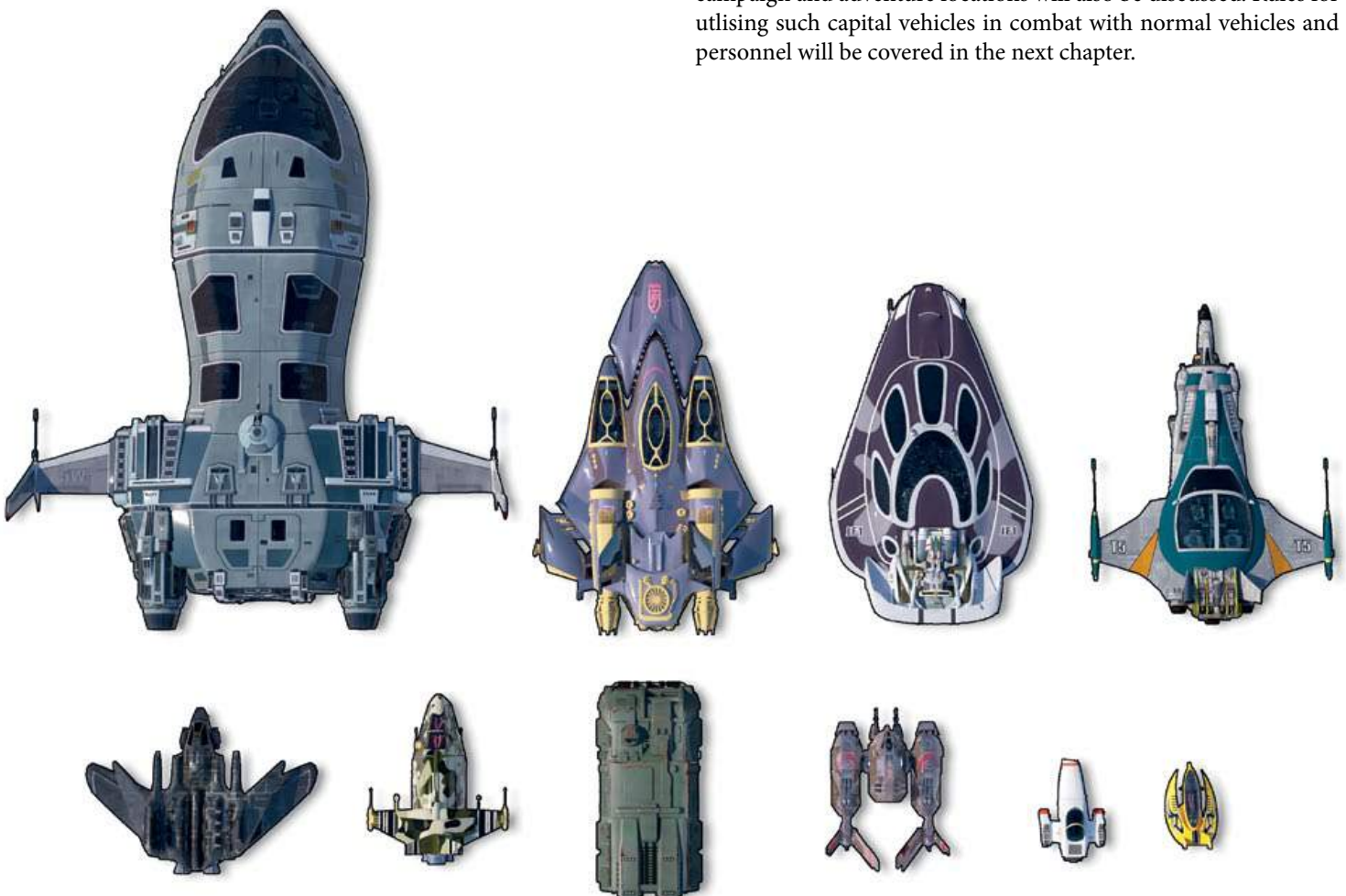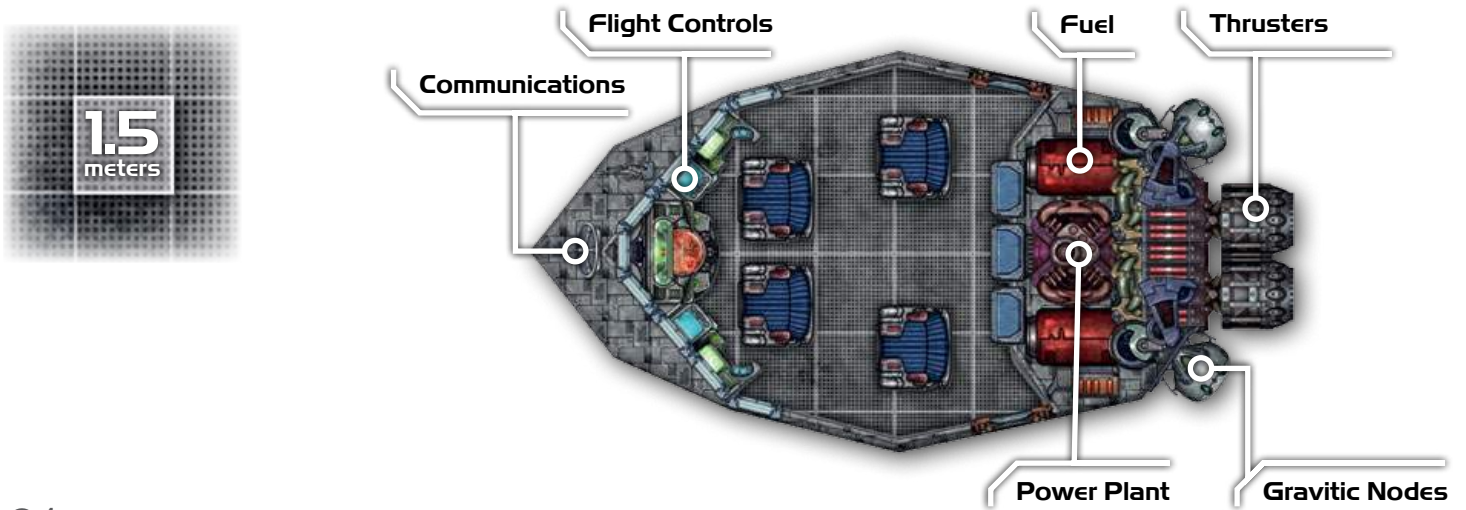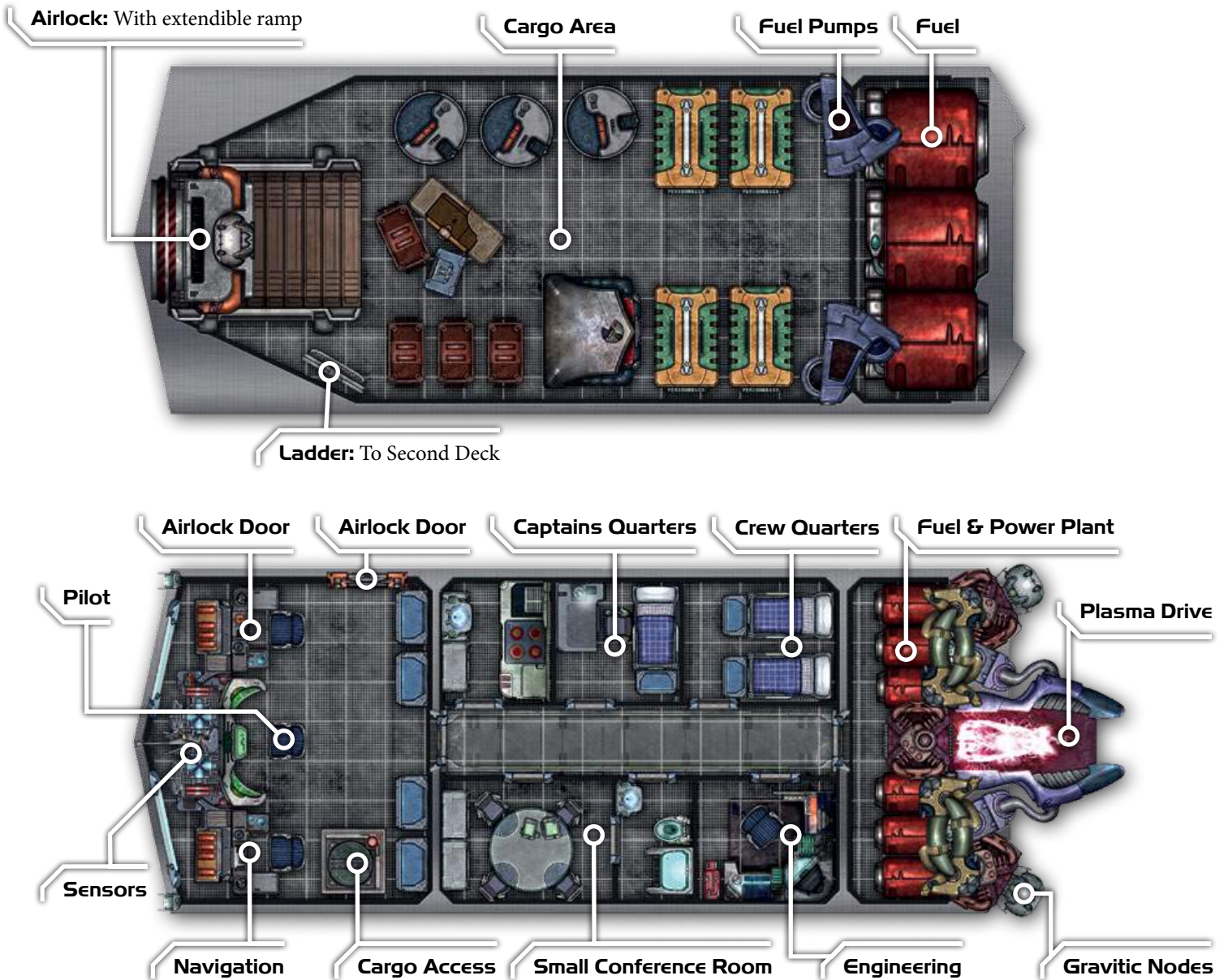
Light Freighter - Deck A

1.5 meters

Ready room: A couple of desks / workstations with a large screen on wall side. Nice view port.

Main airlock: Airlock for EVA, non-docking entry/exit

Lift: Goes to the **A level Cargo Bay 2**, and also provides secondary access via cargo airlock 2 on the port side of the ship.

The Captains Cabin: Complete with desk, chair, holoscreen and his personal bathroom. The First Officer has the cabin across the hall.

Main Docking Ring: An airlock with docking tube (for standardized station docking)

Cargo airlock & lift: Also storage area for supplies, equipment & spares. Cargo Master's station is here.

Shield generator & Computer Core: Two communication arrays (the dishes) and two sensor arrays, on either side.

Chef's Galley: This tiny kitchen is where all food is prepped.

Secondary Airlock

Communications Room: There is a floor hatch which allows access down a ladder to the larger cargo area below. There is a second iris door next to this hatch that goes to the galley, because the cabinets in here are additional cold storage freezers and food supply cabinets.

Dining and recreation area: Along the outer wall are two large holo screens for movies or external view. There is a desk/workstation/communications near the galley end and comfortable seats along the inside wall.

The Bridge: There are the blue lockers along the back wall (6) and at least four space-suits. Perhaps the Captain has to go down with the ship. There are six 'view ports' and a variety of consoles and stations, potentially pilot, navigations, systems, and maybe weapons. then the captain's chair.

Crew cabin: Four beds (as bunks) with lockers or two. The panel along the wall is a console for checking messages, communication purposes.

Deluxe stateroom (1 of 2): offers similar amenities as the first six, but with two twin beds instead and a comfy chair instead of a workstation.

Storage Area: and stairwell access to cargo area. Same on port side.

Engineering room: Here the hyper drive and reactors are powered. The airlock at the port side is the aft portside airlock. There are various workstations here, environmental is all along the starboard side (to the left as you walk in). And then you have all the engineering stuff. Note that the non-ftl drives are on the **A level.**

Sick Bay: As you walk in to the right is a sterile barrier with a light airlock door with 3 med-beds. The left wall has a surgery table, a defibrillator, a diagnostic chair, cryotank, and a regeneration tank.

Passenger cabin (1 of 6): These offer a double sized bed, private shower, toilet, sink, a sofa seat facing a holo panel, a closet like cabinet and a desk workstation with a chair and a nifty view port.

Light Freighter - Deck B

1.5 meters

Main Docking Ring: It has a heavier duty door in case of accident with the dockng tube.

Cargo Lifts: These are used by people as well.
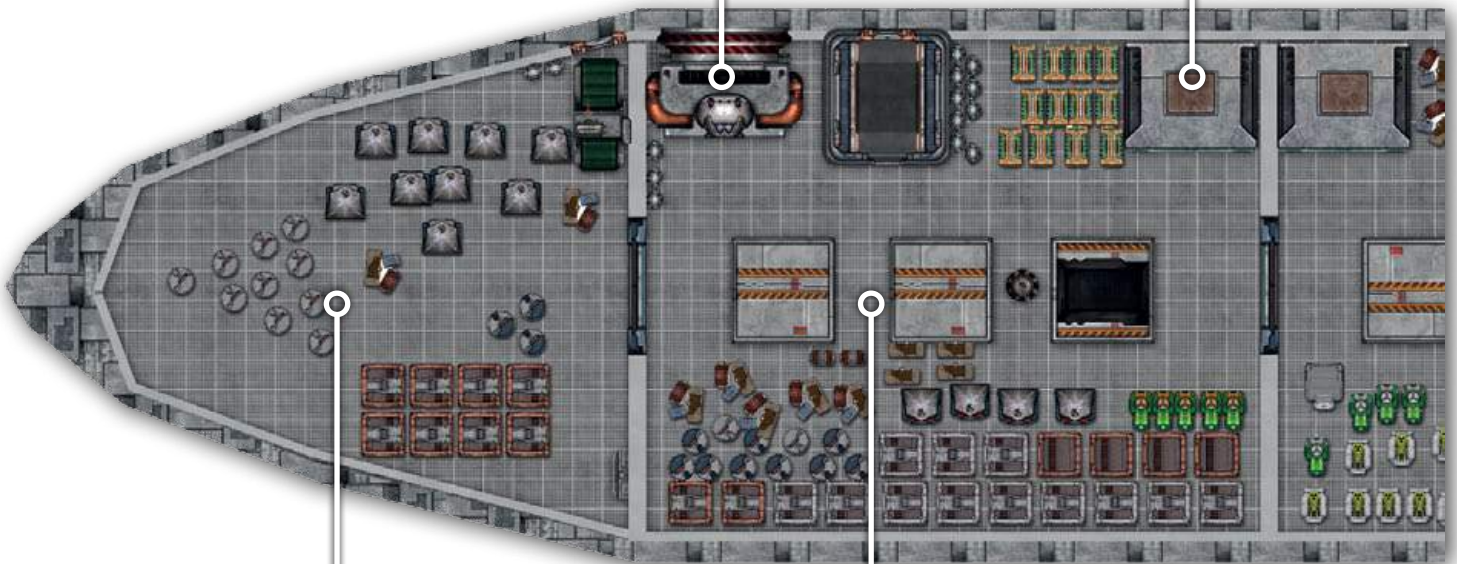
Cargo Bay 1: It has a small cargo loading conveyor with an airlock door. A ladder at the port side climbs up to the A deck hatch.

Cargo Bay 2: Has a large airlock and can also be accessed via the main A deck via lift. There are three hatches on the floor, which access a smaller cargo 'belly' of the ship.

Cargo Bay 3: No direct airlock so cargo has to come in either from the lift, or from the other cargo bay. There are two spiral staircases that go up to the A deck. Note there is a small hatch to the belly stowage area too.

Fuel tanks: for the massive magneto-gravitic engines and power plants to the rear.
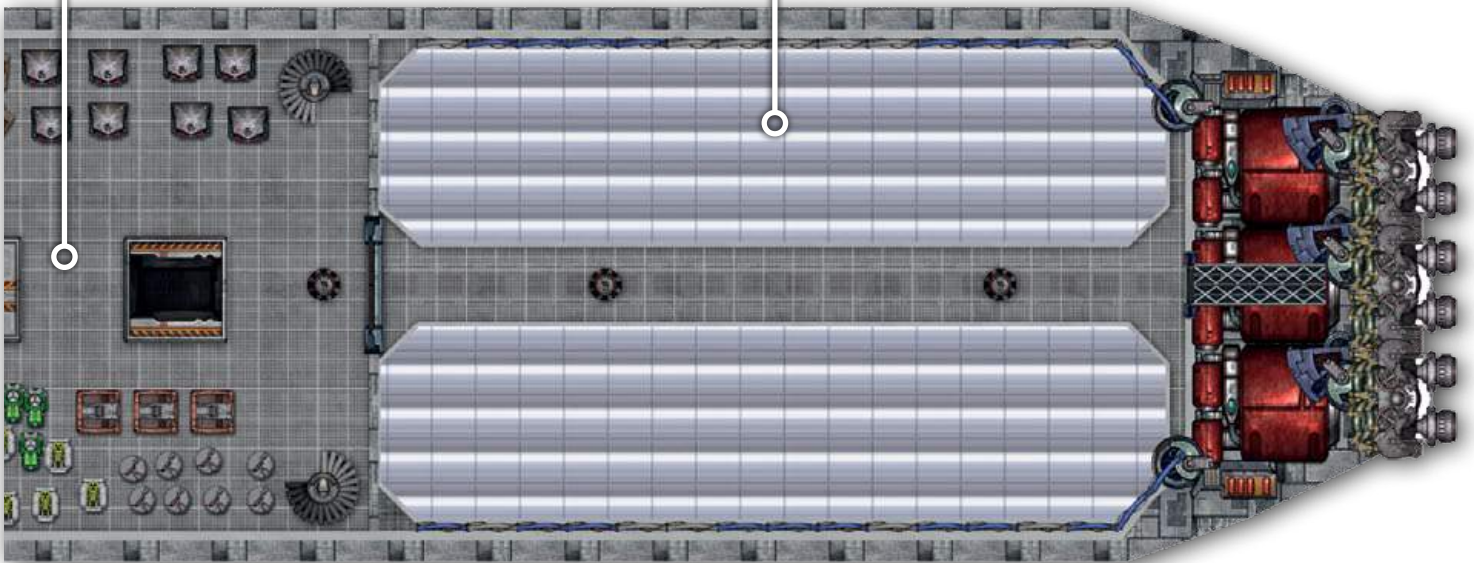
⊗ Transport Shuttle - Deck A

1.5 meters

Communications, Sensors & Computer Core

Weapon Hardpoint

Starport Gunner Station

Armored Hull: protects troops on the military version of this vessel.

Shield Generator

Passenger Airlock

Pilot & Navigation Officer

Port Gunner Station

Weapon Hardpoint

Command & Control Station, Battlefield Management and Communications: Can be transferred or network clustered with other transport shuttles for coordination of assault landings, military operations. AI assisted.

Small cargo area: With lift to larger cargo area that runs along length of belly.

Passenger Area: 64 seats

Magneto-gravitic drive and power plant.

docking tubes: one port and one starboard

Transport Shuttle - Deck B

1.5 meters

Airlock 1

Docking Tube

Airlock 2

Airlock 3

Lift to upper deck:
This deck is 70% of the
cross-section of the
shuttle 'cylinder'.

**Life Support &
Environmental
Systems**

Airlock 4

Fuel Tanks

Scoutship - Deck A

1.5 meters

Cargo Bay 1

Secure area: Armory. Also Access to pressurized gunners stations.

Lift to Deck B

Starport Gunner Station

Weapon Hardpoint

Airlock 1

Weapon Hardpoint

Science laboratory and computer environment.

Port Gunner Station

Armored specimen chamber: Capable of maintaining native atmosphere and pressure for specimens.

Pressurized Airlock:
For entering / leaving
hangar bay when not
pressurized.

Aft Starboard Gunner:
Station and weapon
hardpoint. This is a
pressurized compartment.

Hangar / Landing pad:
For 4-person shuttles,
fighters, and other small
space craft.

Cargo Area

**Hanger Bay
Doors**

Airlock door: Requires
Hangar bay to be
pressurized to open.

Aft Port Gunner:
Station and weapon
hardpoint. This
is a pressurized
compartment.

⊕ Scoutship - Deck B

1.5 meters

Main Docking Ring: It has a heavy duty door in case of accident with the dockng tube.

Lift to Deck A

More Cargo area or equipment / supplies storage

Full Airlock: For entering Ground Vehicle Hangar when outer doors open to hostile environments.

Fuel tanks: for the magneto-gravitic engines and power plants to the rear.

Magneto-gravitic drive and power plant.

Ground Vehicle Hangar: This is where hovercraft, cars, mopeds, you name it, can enter or leave the ship.

Scoutship - Deck C

1.5 meters

Shield Generator, Communications Arrays & Sensors

Main Docking Ring: It has a heavier duty door in case of accident with the dockng tube.

Cargo Airlock & Lift: Workstation is for Cargo Master.

Captains Quarters

Access Ladder: to lower deck.

Briefing room

Main Airlock

Exploration Conference Area
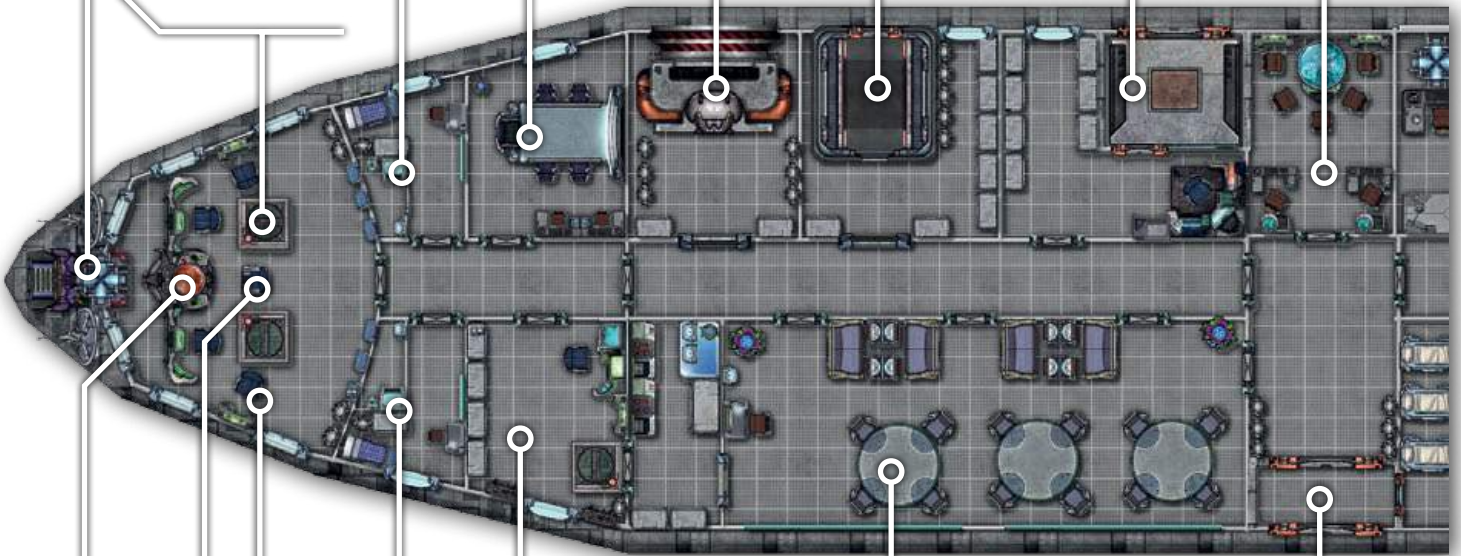
Flight & Navigation Stations

Communications

Secondary Airlock

First Officers Quarters

Eating area & Galley

Operations Station

Captains Chair

Science Lab &
Working Area

Deluxe stateroom (1 of 2): offers similar amenities as the first six, but with three beds instead and a comfy chair instead of a workstation.

Sick Bay: As you walk in to the right is a sterile barrier with a light airlock door with 3 med-beds. The left wall has a surgery table, a defibrillator, a diagnostic chair, cryotank, and a regeneration tank.

Engineering room: Here the drives and reactors are controlled. The airlock at the port side is the aft portside airlock. There are various workstations here, environmental is all along the starboard side (to the left as you walk in). And then you have all the engineering stuff. Note that the drives proper are on the B level.

Passenger cabin (1 of 6): These offer a double sized bed, private shower, toilet, sink, a sofa seat facing a holo panel, a closet like cabinet and a desk workstation with a chair and a nifty view port.

✪ SysOp's Note – Vehicles and Energy

Planetbound vehicles, such as groundcars, ships, and aircraft, use a certain number of energy units per ton per kilometer traveled. The rate of energy consumption varies according to the type of locomotion:

- **Land (wheeled, tracked or surface effect):** 1 energy unit per kilometer per ton
- **Land (gravitic):** 2 energy units per kilometer per ton
- **Marine (speedboats and submarines):** 1 energy unit per kilometer per ton
- **Air (jets):** 2 energy units per km per ton
- **Air (helicopters):** 3 energy units per km per ton
- **Air (gravitic):** 4 energy units per kilometer per ton

The rate of energy consumption assumes that the vehicle is travelling at 50% of maximum speed in normal weather conditions. SysOps who desire extra realism and don't mind some additional book-keeping may adjust these consumption rates as follows:

- 1-50% velocity, normal conditions: use listed energy rate.
- 51-100% velocity: double energy rate (after any additions for weather).
- Hostile weather conditions: add 50% of normal energy rate.

✪ **Example:** *A groundcar normally requires 2 energy units per kilometer. If driven at maximum velocity, the same groundcar will require 4 energy units. If driven at up to 50% velocity in really bad weather such as a snowstorm, the groundcar will use an extra 1 energy unit per kilometer or 3 energy units in total. If the groundcar is driven at maximum velocity in that snowstorm, then it will consume (2 (normal) + 1 (bad weather)) x2 (for velocity), which is 3 x2 or 6 energy units per kilometer.*

Space vehicles utilize the magneto-gravitic drive, which is normally powered by microfusion generators. This uses 1 energy units per "gee" of acceleration per hour per ton of mass. Using the Lagrange drive to initiate entry into hyperspace requires 1 energy unit per ton of mass. Spacecraft always have more than the minimum number of microfusion generators required to attain their maximum acceleration, so that they have backup generators and have some that can be dedicated to powering vital functions such as weapons, shields, life support …

✪ **Example:** *A corvette can accelerate at up to 600 "gees". Corvettes have a total mass of 6,000 tons, so total energy consumption is 3,600,000 (600 x 6,000) energy units under maximum acceleration or deceleration. A hyperspace jump will require 6,000 energy units.*

Vehicles may receive their energy from fusion generators supplied by deuterium canisters or through vehicle power packs:

Deuterium canister: This contains hydrogen deuterium (the fuel of choice for nuclear fusion). 75% of the price is for the canister itself. Early versions cost twice as much; halve the listed cost for Advanced versions.

Microfusion generator: This is a non-portable generator, which uses very small-scale nuclear fusion to produce electricity. A single generator can supply 10,000 energy units per hour for 10 hours on a single canister of hydrogen deuterium – the total energy output is 100,000 energy units. (Early versions can supply 5,000 units per hour and are twice as massive and twice as expensive; Advanced versions are half the size and cost of their Mature counterparts.) Generators capable of supplying energy at faster rates exist – models capable of 20,000 energy units per hour output cost four times as much as standard generators, while 30,000 energy units per hour output costs nine times as much. These rapid generators are used in certain vehicles where there isn't room for multiple standard generators. All generators are very safe and extremely tamper-proof.

Vehicle Power Pack: This is a bulky battery (40 cm cube) for use with vehicles (such as groundcars etc.) that are too small to mount their own microfusion generator. The power pack holds 2,000 energy units and takes five hours to fully recharge. (Early versions store 1,000 units, take ten hours to recharge and cost twice as much as their Mature counterparts; Advanced versions have 4,000 energy unit capacities and are half the cost of Mature versions.)

Item	Avail	Cost	Mass
Deuterium canister	R	1000	20
Microfusion generator	R	100000	1000
Vehicle Power Pack	U	500	50

VEHICLE WEAPONRY

All of the weapons in this section are designed for use on vehicles or structures against other vehicles. Their Mark rating determines their Attack Size. The appropriate Gunnery skill (Modern Direct-fire Systems, Modern Indirect-fire Systems or Modern Missiles) is required to fire these weapons. For vehicle weaponry, changes in technological development are represented by alterations in the weapon's fumble range. Early versions add 1 to the fumble range; Advanced versions subtract 1 from the fumble range.

✪ **Example:** *A Mature-class Laser Cannon has a fumble range of 01-02; an Early version would have a fumble range of 01-03; an Advanced Laser Cannon has a fumble range of 01.*

The "cost" of vehicle weaponry represents the cost of building them into a vehicle at construction time or the cost of replacing them.

In addition, mines for use on land or at sea against vehicles are also included in this section.

Anti-vehicle Mine (Mark I-V): The anti-vehicle mine is a large explosive device, which detonates when triggered by contact or through detecting a nearby vehicle (by sensing the mass, power emanations, etc.). Mines are rated in lethality by Mark numbers. Multiply the Mark number (I to V) by 5 to give the primary blast zone radius and the secondary blast zone radius in meters – any vehicle within the blast zone radii suffers damage. Anti-vehicle Mines have a Primary Blast Bonus of +75 and a Secondary Blast Bonus of +50 against personnel (not vehicles).

Autocannon: Sometimes called projectile cannon, autocannon fire heavy metal slugs or shells much like conventional firearms, but faster and harder. Autocannon fire can punch holes through even starship hulls.

Howitzer: A howitzer is an indirect-fire weapon that lobs an inert shell or an explosive shell in parabolic trajectories at steep angles of descents. Howitzers do not need line-of-sight to their targets and can attack targets over the horizon, behind enemy lines, etc. To resolve howitzer attacks with inert shells, simply use Gunnery: Modern Indirect-fire Systems. To resolve howitzer attacks with explosive shells, use the grenade rules with Gunnery: Modern Indirect-fire Systems as the aiming skill and treat the shells as Anti-vehicle Mines in terms of damage. In space, howitzers must be used as direct-fire weapons (using Gunnery: Modern Direct-fire Systems). They cannot be sensibly used in indirect-fire mode inside orbital habitats where the apparent gravity is generated by centrifrugal force and the "roof" is too low!

Laser Cannon: More effective in space than atmosphere, laser cannon project coherent microwave radiation to burn through enemy vessels.

Nuclear Warhead: This is typically a nuclear fusion bomb, which can replace the conventional explosive payload of a space or standard missile. The blast radius of these warheads is typically five kilometers for space combat. Warheads with larger blast radii are normally reserved for the thankfully extremely rare instances of planetary bombardment. Only vehicles or structures protected by the magneto-gravitic shield have any chance of surviving a nuclear warhead if they are within its blast radius. Nuclear warheads are considered Capital-class weaponry, even though they may be carried by smaller vehicles.

Particle Beam Cannon: By ionizing high-energy particles and manipulating magnetic fields, these cannon effectively drill through matter, damaging structures, destroying circuitry and nanotech, and killing organic material.

Point Defense System: This is a battery of microlasers and mini-autocannon that is typically used to destroy incoming missiles, torpedoes and other similar-sized objects by shredding them into much smaller harmless debris. A Point Defense System can be used at very close range as a weapons system against other targets – essentially (the subset of) the battery collectively aimed at the target is equivalent to a Mark I vehicle weapon doing both Vehicle Energy and Vehicle Piercing criticals (make only one attack but apply the results from both critical tables). Sometimes useful for menacing natives when trading on low-technology worlds.

Plasma Cannon: These fire jets of superheated helium (rather than mere flammable gas) and can be devastating in close combat, but lack the range of other weaponry.

Space Missile: These non-nuclear missiles are designed for use in space and have miniature magneto-gravitic drives. Standard pursuit ranges are 1 million kilometers, 10 million kilometers (x5 cost, x2 mass), 100 million kilometers (x20 cost, x5 mass), and 1 billion kilometers (x100 cost, x20 mass). Space missiles can easily reach 10% of lightspeed and some models can achieve 14% of lightspeed – note that space missiles (if fired in the same direction

as their ship's direction of travel) have an initial velocity equal to the launching ship. Acceleration rates are between 600 to 1200 "gees".

Standard Missile: These conventional missiles are designed for planetary use only, but may be deployed as missile batteries or as the armament for planetbound vehicles. The range of standard missiles can be 100km (max speed 3600 km/h or 1 km/sec), 1,000km (max speed 10800 km/h or 3 km/sec, x5 cost, x3 mass), or 10,000km (max speed 6km/sec or 21,600 km/h, x25 cost, x10 mass).

Surface-to-Air Missile: These missiles can be fired from static platforms or surface vehicles at airborne targets. Mark I versions can be launched by man-portable launcher (use Weapon Skill: Large Launchers not Gunnery). Their pursuit range is limited to ten kilometers, but their maximum velocity is 1800 km/h (or 0.5 km/sec).

Table 1.10 Vehicles							
Vehicle	Avail	Cost	Mass	Psngrs	Cargo	Speed/Accel	Energy
GEM Car	U	14K	2.5	4	2.4	200 km/h	2vp
GEM Van	U	16K	4	2	7.35	150 km/h	3vp
Gravcarrier	R	960K	44	25	5	200 km/h	2F (10)
Gravtank	R	1900K	80	5	7	200 km/h	4F (20)
Gravitic bike	U	22K	0.8	2	0.33	500 km/h	1vp
Gravitic car	U	45K	2	4	0.75	400 km/h	3vp
Gravitic chair	U	2.5K	0.5	1	0.1	50 km/h	1vp
Gravitic truck (medium)	U	320K	20	2	39	300 km/h	25vp
Gravitic van	U	85K	4	2	7	300 km/h	5vp
Groundcar	U	8K	2	4	1	200 km/h	2vp
Motorbike	U	3K	0.8	2	0.39	200 km/h	1vp
Truck (medium)	U	48K	20	2	41.1	150 km/h	15vp
Van	U	10K	3	2	4.65	200 km/h	2vp
Hydrofoil – small	U	60K	5	4	5.55	150 km/h	5vp
Hydrofoil – medium	U	120K	10	8	6.45	150 km/h	20vp
Hydrofoil – xeno	R	1500K	97.5	6	24.9	100 km/h	2F (20)
Motorboat – small	U	20K	3	6	2.85	100 km/h	3vp
Motorboat – medium	U	35K	5	10	4	100 km/h	6vp
Motorboat / miniyacht	U	600K	60	10	12.3	100 km/h	2F (10)
Submarine – exploration	R	3M	300	24	21	200 km/h	8F (50)
Submarine – military	R	72M	2000	30	563.25	250 km/h	100F (500)
Submarine - research	U	120K	40	4	11.1	100 km/h	1F (10)
Airplane – small	U	525K	5	6	1.2	500 km/h	20vp
Airplane – medium passenger	R	17M	70	50	28.2	1000 km/h	20F (20)

Table 1.10 Vehicles							
Vehicle	Avail	Cost	Mass	Psngrs	Cargo	Speed/Accel	Energy
Airplane – fighter	R	21M	25	2	1.2	3000 km/h	6F3 (30)
Gravplane – small	R	625K	10	6	0.6	500 km/h	3F (6)
Gravplane – large	R	9M	90	50	30	1000 km/h	36F (80)
Gravplane – fighter	R	14M	30	2	1.5	2500 km/h	10F3 (30)
Helicopter – small	U	20K	3	4	2.1	200 km/h	5vp
Helicopter – large	U	60K	10	12	6	250 km/h	25vp
Helicopter - assault	R	120K	6	2	0.1	300 km/h	18vp
Aircar – small	R	140K	5	4	1.5	200 km/h (wheel) / 400 km/h (grav/air)	30vp
Aircar – medium	R	575K	10	6	3.66	200 km/h (wheel) / 400 km/h (grav/air)	3F (6)
Gravwalker – small	R	2400K	30	4	1.35	50 km/h (walk) / 400 km/h (grav)	3F (20)
Gravwalker - medium	R	3M	50	8	5.85	50 km/h (walk) / 400 km/h (grav)	3F2 (50)
Seacar – small	R	750K	20	4	5.4	200 km/h (above / underwater) / 400 km/h (grav)	50vp
Seacar - large	R	2M	40	8	13.5	200 km/h (above / underwater) / 400 km/h (grav)	4F (10)
Corvette	R	650M	6000	50	1300	0.07c / 600g	400F (2000)
Escape Pod	U	400K	20	5	1.5	39,000km/h /5g	1F (5)
Freighter – light	R	280M	6000	10	7770	0.035c / 300g	225F (2000)
Freighter – medium	R	460M	10000	20	15825	0.035c / 300g	360F (3000)
Maintenance Pod	U	210K	10	1	0.72	16,000km/h /1g	1F (5)
Mini-shuttle	R	1.5M	50	4	6	0.01c / 100g	1F (10)
Scoutship	R	540M	6000	12	3730	0.07c / 600g	400F (2000)
Shuttle – assault	R	85M	960	50	810	0.05c / 600g	80F (500)
Shuttle – courier	R	85M	640	20	50	0.07c / 900g	75F (500)
Shuttle – transport	R	40M	750	50	630	0.035c / 300g	30F (300)
Starfighter – 1 person	R	10M	100	1	3.6	0.07c / 600g	3F3 (10)
Starfighter – 2 person	R	17M	150	2	4.55	0.07c / 600g	4F3 (10)

⊗ Notes:

Cost: This is measured in credits, K indicates 1000's, M indicates 1,000,000's. All values rounded up.

Mass: This is measured in metric tons (1 ton = 1,000kg), and is the total of hull mass, hull armoring and a full cargo load.

Psngrs: This includes the pilot and crew.

Cargo: This is the available cargo space, measured in cubic meters (or kiloliters).

Speed/Accel: For planet-bound vehicles, only the maximum safe speed in km/h is given. For space vehicles, the maximum safe speed (in either km/h or as a fraction of c (lightspeed)) and the maximum safe acceleration (in "gees") are given.

Energy: This will be given as either the number of vehicle power packs ("vp") or the number of microfusion generator units ("F") used to power the vehicle (any digit after the F indicates its energy multiplier). Numbers in parentheses are the number of deuterium canisters normally carried by the vehicle.

Hits: This is the Structural Hits of the vehicle.

Init: This is the vehicle's bonus or penalty to Initiative.

Armor: This is the vehicle's Armor Rating. None indicates no armor fitted, so value is zero.

Sh: This is the vehicle's Shield Rating. None indicates no shields fitted, so Shield Rating is zero If in parentheses, shields are non-standard for this vehicle type. Shields are normally only fitted to vehicles powered by a microfusion generator.

EW: This is the vehicle's Electronic Warfare Rating. None indicates no EW system fitted, so EW Rating is zero. If in parentheses, electronic countermeasures are non-standard for this vehicle type.

PD: This is the vehicle's Point Defense Rating. None indicates no Point Defense system fitted, so PD Rating is zero. If in parentheses, point defense systems are non-standard for this vehicle type.

Man: This is the vehicle's Maneuverability Rating.

Weaponry: The number is the Weapon Rating of the particular weapons system. If in parentheses, weapon systems are not normally fitted.

Stats: The vehicular equivalents of the Strength, Agility, Constitution and Quickness stats are all 50 with no stat bonus for these vehicles, so are not included on these tables.

Table 1.11 Vehicle Combat Statistics							
Vehicle	Init	Hits	Armor	Sh.	EW	PD	Man	Weaponry
GEM Car	-10	10	None	None	None	None	-10	(+0 Light Machinegun)
GEM Van	-10	10	None	None	None	None	-10	(+0 Light Machinegun)
Gravcarrier	-26	31	20	10	10	None	-16	+0 Tiny Autocannon, +0 Tiny Warhead
Gravtank	-26	40	20	10	10	None	-16	+0 Small Autocannon, +0 Small Warhead
Gravitic bike	-10	3	None	None	None	None	0	N/A
Gravitic car	-10	10	None	None	None	None	0	(+0 Light Support Laser)
Gravitic chair	-10	2	None	None	None	None	0	N/A
Gravitic truck (medium)	-10	14	None	None	None	None	0	(+0 Medium Support Laser)
Gravitic van	-10	10	None	None	None	None	0	(+0 Light Support Laser)
Groundcar	-10	10	None	None	None	None	-5	(+0 Light Machinegun)
Motorbike	-10	3	None	None	None	None	-5	N/A
Truck	-10	14	None	None	None	None	-5	(+0 Medium Machinegun)
Van	-10	10	None	None	None	None	-5	(+0 Light Machinegun)
Hydrofoil – small	-5	12	5	None	None	None	5	(+0 Light Machinegun)
Hydrofoil – large	-5	15	5	None	None	None	5	(+0 Medium Machinegun)
Hydrofoil – xeno	-3	38	15	10	None	None	7	+0 Tiny Autocannon
Motorboat – small	-5	11	5	None	None	None	0	(+0 Light Machinegun)
Motorboat – medium	-5	12	5	None	None	None	0	(+0 Medium Machinegun)
Motorboat / miniyacht	-5	31	5	10	None	None	0	(+0 Tiny Autocannon)
Submarine – exploration	-12	53	10	10	None	None	-7	+0 Tiny Autocannon / +0 Tiny Warhead
Submarine – military	-6	105	20	10	10	10	-1	+0 Huge Warhead (x2) / +0 Tiny Autocannon
Submarine - research	-5	20	5	None	None	None	0	(+0 Light Machinegun)
Airplane – small	-5	12	5	None	None	None	5	(+0 Light Machinegun)
Airplane – medium passenger	-5	38	5	None	None	None	5	(+0 Heavy Machinegun)
Airplane – fighter	-5	23	5	None	10	None	5	+0 Tiny Autocannon, +0 Tiny Warhead
Gravplane – small	-5	14	5	10	None	None	10	(+0 Medium Machinegun)
Gravplane – large	-5	38	5	10	None	None	10	(+0 Heavy Machinegun)
Gravplane – fighter	-5	23	5	10	10	None	10	+0 Tiny Autocannon, +0 Tiny Warhead

Table 1.11 Vehicle Combat Statistics							
Vehicle	Init	Hits	Armor	Sh.	EW	PD	Man	Weaponry
Helicopter – small	-5	10	5	None	None	None	0	(+0 Light Machinegun)
Helicopter – large	-5	13	5	None	None	None	0	(+10 Medium Machinegun)
Helicopter - assault	-5	11	5	None	10	None	0	+0 Tiny Autocannon, +0 Tiny Warhead
Aircar – small	-5	12	5	None	None	None	0wh, 5gr, 10air	(+0 Light Machinegun)
Aircar – medium	-5	14	5	None	None	None	0wh, 5gr, 10air	(+0 Medium Machinegun)
Gravwalker – small	-3	21	15	10	10	None	2wk, 7gr	(+0 Tiny Lasercannon)
Gravwalker – medium	-3	25	15	10	10	None	2wk, 7gr	(+0 Tiny Lasercannon)
Seacar – small	-5	15	5	None	None	None	0sub, 5gr, 5hyd	(+0 Medium Machinegun)
Seacar – medium	-5	20	5	None	None	None	0sub, 5gr, 5hyd	(+0 Tiny Autocannon)
Corvette	-6	110	20	10	10	10	9	+0 Medium Laser (x4) +0 Medium Autocannon (x4) +0 Medium Warhead (x2)
Escape Pod	0	16	10	10	None	None	15	None
Freighter – light	0	110	10	10	10	(10)	15	+0 Tiny Laser
Freighter – medium	0	120	10	10	10	(10)	15	+10 Tiny Laser
Maintenance Pod	0	14	10	None	None	None	15	None
Mini-shuttle	0	44	10	10	None	None	15	None
Scoutship	-6	110	20	10	10	10	9	+0 Small Laser +0 Medium Autocannon
Shuttle – assault	-6	66	20	10	10	10	9	+0 Small Lasercannon +0 Medium Autocannon
Shuttle – courier	-6	61	20	10	10	10	9	+0 Small Lasercannon +0 Small Autocannon
Shuttle – transport	-3	64	15	10	10	None	12	+0 Small Lasercannon (+0 Small Autocannon)
Starfighter – 1 person	-6	41	20	10	10	None	9	+0 Tiny Lasercannon +0 Tiny Warhead
Starfighter – 2 person	-6	50	20	10	10	None	9	+0 Small Lasercannon +0 Tiny Warhead

Table 1.12 Vehicular Weapons

Item	Avail	Cost	Mass	Attack Size/Type	Fumble
Anti-vehicle Mine (Mark I)	R	0.5K	5	Tiny Warhead	01-02
Anti-vehicle Mine (Mark II)	R	1K	10	Small Warhead	01-02
Anti-vehicle Mine (Mark III)	R	1.5K	20	Medium Warhead	01-02
Anti-vehicle Mine (Mark IV)	R	2K	30	Large Warhead	01-02
Anti-vehicle Mine (Mark V)	R	2.5K	40	Huge Warhead	01-02
Autocannon (Mark I)	R	10K	250	Tiny Piercing	01-02
Autocannon (Mark II)	R	50K	1K	Small Piercing	01-02
Autocannon (Mark III)	R	100K	2K	Medium Piercing	01-02
Autocannon (Mark IV)	R	250K	5K	Large Piercing	01-02
Autocannon (Mark V)	R	1M	20K	Huge Piercing	01-02
Howitzer (Mark I)	R	20K	500	Tiny Piercing	01-04
Howitzer (Mark II)	R	100K	2K	Small Piercing	01-04
Howitzer (Mark III)	R	200K	4K	Medium Piercing	01-04
Howitzer (Mark IV)	R	500K	10K	Large Piercing	01-04
Howitzer (Mark V)	R	2M	40K	Huge Piercing	01-04
Laser Cannon (Mark I)	R	20K	250	Tiny Energy	01-02
Laser Cannon (Mark II)	R	100K	1K	Small Energy	01-02
Laser Cannon (Mark III)	R	200K	2K	Medium Energy	01-02
Laser Cannon (Mark IV)	R	500K	5K	Large Energy	01-02
Laser Cannon (Mark V)	R	2M	20K	Huge Energy	01-02
Nuclear Warhead	R	250K	50	Medium Capital-class Warhead	01-02
Particle Beam Cannon (Mark I)	R	25K	500	Tiny Energy	01-03
Particle Beam Cannon (Mark II)	R	125K	2K	Small Energy	01-03
Particle Beam Cannon (Mark III)	R	300K	4K	Medium Energy	01-03
Particle Beam Cannon (Mark IV)	R	750K	10K	Large Energy	01-03
Particle Beam Cannon (Mark V)	R	3M	40K	Huge Energy	01-03
Point Defense System	R	10K per hull ton	5% of hull tonnage	Tiny Piercing and Tiny Energy	01-05
Plasma Cannon (Mark I)	R	12K	250	Tiny Energy	01-03
Plasma Cannon (Mark II)	R	30K	1K	Small Energy	01-03
Plasma Cannon (Mark III)	R	100K	2K	Medium Energy	01-03
Plasma Cannon (Mark IV)	R	300K	5K	Large Energy	01-03
Plasma Cannon (Mark V)	R	1M	20K	Huge Energy	01-03
Space Missile (Mark I)	R	10K	1K	Tiny Warhead	01-02
Space Missile (Mark II)	R	20K	2K	Small Warhead	01-02
Space Missile (Mark III)	R	30K	3K	Medium Warhead	01-02
Space Missile (Mark IV)	R	40K	4K	Large Warhead	01-02
Space Missile (Mark V)	R	50K	5K	Huge Warhead	01-02
Standard Missile (Mark I)	R	5K	100	Tiny Warhead	01-02
Standard Missile (Mark II)	R	10K	200	Small Warhead	01-02
Standard Missile (Mark III)	R	15K	400	Medium Warhead	01-02
Standard Missile (Mark IV)	R	20K	600	Large Warhead	01-02

Table 1.12 Vehicular Weapons

Item	Avail	Cost	Mass	Attack Size/Type	Fumble
Standard Missile (Mark V)	R	25K	800	Huge Warhead	01-02
Surface-to-Air (Mark I)	R	1K	15	Tiny Warhead	01-02
Surface-to-Air (Mark II)	R	2K	30	Small Warhead	01-02
Surface-to-Air (Mark III)	R	3K	100	Medium Warhead	01-02
Surface-to-Air (Mark IV)	R	4K	200	Large Warhead	01-02
Surface-to-Air (Mark V)	R	5K	400	Huge Warhead	01-02

VEHICLE COMBAT

Epic space battles ranging from the clash of rocketships in classic science fiction through the cinematic heroics of tiny starfighters and immense starships to the space opera retellings of Napoleonic navies and World War aviator duels are key elements of the intense action that can pervade a science-fiction campaign.

In HARP SF, characters can fight their battles in armored gravtanks, swift speedboats, fighter jets, or starships. In vehicular combat, seat-of-the-pants driving and hotshot piloting is crucial in evading devastating damage. The best defense is an effective offense – gunners lock onto their targets with hunter-seeker missiles and gigawatt lasers.

This chapter will explain the rules for Vehicular Combat. **HARP SF** describes Personal Combat.

ABOUT VEHICLE COMBAT

Any vehicle can be a deadly weapon in its own right. Arm a vehicle with autocannons, gigawatt lasers, or missile launchers and you have a potential killing machine. Meters of hullmetal and the protection of a magneto-gravitic shield can lull crew and passengers into a false sense of security – until the thermonuclear blast of a fusion warhead vaporizes them.

Vehicle combat is therefore more lethal than personal combat. When a vehicle is disabled or destroyed in a battle, there's a very real risk that everyone inside will be in dire straits. The best advice is, as always, don't fight if you don't have to. If you have to fight:

- ☐ Think ahead. Combat is often unexpected, but that doesn't mean you can't be ready for it!

- ☐ Make sure the vehicle is fully prepared with weapons systems armed, shields up, electronic countermeasures readied, and all systems in working order.

- ☐ Don't just trade attacks with the opponent. Use piloting skill to fly offensively or defensively, use electronic countermeasures to fool the enemy craft's weaponry, use point defense systems to destroy incoming warheads, and have the engineer fine-tune shields and drive systems.

- ☐ Use the environment and make sure you know where your line of retreat is.

⊗ SysOp's Note

Vehicle combat is a team effort in HARP SF. The aim is to involve as many PCs as possible. Pilots can improve their fellow gunners' chances of success or increase the vehicle's Defensive Bonus. Communications officers can operate the electronic countermeasure systems. Each weapons system should have its own gunner, while point defense should be handled separately. Lastly, characters with an engineering focus can be squeezing extra

speed from the engines, maximizing shield coverage or desperately trying to repair damaged systems.

It may be difficult to achieve the ideal of involving everyone in the action, particularly in smaller vehicles. However, even back-seat passengers in a groundcar can open a side window and take a few pot shots at their foes with their personal weapons.

VEHICLE COMBAT DEFINITIONS

Armor Rating: This measures the strength of a vehicle's structure, both in terms of material and construction.

Attack Type: This is what determines the critical table to use in resolving the vehicle attack. There are four critical tables available for vehicle combat.

Critical: Vehicle Critical Tables are used to determine the quantity and nature of inflicted damage. This is normally a loss of Structural Hits but vehicle subsystems (such as propulsion, communications/control, life support) can be damaged or destroyed.

Defensive Bonus (DB): This is any factor that keeps a vehicle from being damaged. The vehicle itself can contribute its Armor, Electronic Warfare, Maneuverability, and Shield Ratings to DB; pilots, communications officers, and engineers can improve or degrade this by using relevant skills.

Electronic Warfare Rating: This measures the quality of a vehicle's electronic countermeasure systems, which are used to passively or actively interfere with the targeting systems of other vehicles.

Maneuverability Rating: This measures the ability of a vehicle to execute rapid changes in speed and direction. Highly maneuverable vehicles are better able to dodge attacks.

Offensive Bonus (OB): This is a measure of the vehicle's offensive capability. The vehicle itself contributes Maneuverability and Weapons Rating. Pilots can improve or reduce this by good or bad flying. The key factor, however, is the gunner's Gunnery skill.

Point Defense Rating: This measures the effectiveness of a vehicle's antimissile battery (which may be small rapid-firing lasers or small automatic cannon).

Shield Rating: This measures the strength of a vehicle's "force field" defense, also known as the magneto-gravitic shield. Starships, interstellar and interplanetary, are the only vehicles that always have magneto-gravitic shields. Some planetary vehicles,

typically for military, quasi-military and exploration purposes, also mount shields.

Structural Hits (Hits): This is the most common type of damage inflicted by a vehicle critical table. Every vehicle has a number of Structural Hits. This reflects how much damage the vehicle can absorb before it is disabled or destroyed. When a vehicle reaches zero Hits, its structure has been compromised and it is disabled. If a vehicle's Structural Hits are reduced to a negative number equal to the Structural Hits, it is destroyed, e.g. a motorbike has 20 Structural Hits normally, if it is reduced to –20 Structural Hits or less, then it will be destroyed.

Weapons Rating: This measures the accuracy of a vehicle's weapon systems including targeting software and fire control systems.

Weapon Size: As with personal weapons, vehicle weapon size does not influence whether a hit is made; instead it modifies the degree of damage inflicted.

VEHICLE COMBAT RESOLUTION

In personal combat, the combat round is always two seconds long. In vehicle combat, combat can occur in two second rounds or one minute "turns". Round-based combat is almost always appropriate for land, sea, and air combat. It is also suitable for close range dogfights between starfighters and starships. Turn-based combat should be reserved for long distance missile duels in space, where a salvo of torpedoes might have to blast across thousands of kilometres to reach the intended target and even energy weapons are limited by the lightspeed barrier.

A combat round or turn proceeds as follows:

- All players and the SysOp announce actions for the coming round. Each player is responsible for his/her character and any NPCs he/she may be controlling. The SysOp controls the NPCs in all vehicles opposing the group, while also determining the actions of any third parties caught in the crossfire.

- The player(s) of drivers and pilots who are actually controlling the vehicles must roll and record Initiative. Initiative determines the order in which the crews of the vehicles act in the coming round. The players of other characters do not roll Initiative, unless they are taking independent actions (like firing a personal sidearm out the groundcar's window.) For more on Initiative, see below.

- Resolve all supporting actions and maneuvers in the order of initiative.

- Resolve all combat in the order of initiative. Record the results of all damage.

- Determining Initiative in a vehicle combat uses the same method as personal combat. Each player of an active driver or pilot rolls a single ten-sided die adding in their character's Quickness and Insight bonuses, taking into account any situational modifiers and any bonus/penalty to Initiative from the vehicle itself.

- As OB and DBs are adjusted by the supporting maneuver rolls of multiple crew personnel, including the driver/pilot, these maneuver rolls must be made before the OBs and DBs for that round/turn can be known. Hence each vehicle crew has a single Initiative score.

- The supporting actions are separated from the actual gunnery attacks because the DBs of defending vehicles depend on the actions of their crews.

- The vehicle crew with the highest total acts first, then the second highest, and so on, until all crews have had the opportunity to act.

- The SysOp must also roll Initiative for opposing vehicles.

VEHICLE INITIATIVE MODIFIERS

Circumstances and situations affecting the vehicle can modify the pilot or driver's Initiative. The table below provides Initiative modifiers for a number of common situations involving vehicles. For the gravity well entries, the diameter is the diameter of the planetary or stellar object in kilometers and any vessel within ten diameters of the largest gravity well suffers the appropriate initiative modifier.

Tabke 2.1 Vehicle Initiative Modifiers	
Circumstance	Initiative Modifier
Maneuverability Rating	+1 for every full 10 points
Surprised (first round/turn only)	-20
Driving Only	
Precipitation	
Light or Moderate Rain	-1
Heavy Rain	-2
Light Sleet/Snow/Hail	-1
Moderate Sleet/Snow/Hail	-2
Heavy Sleet/Snow/Hail	-3
Visibility	
Each full 50m < 1km (fog, smoke, etc)	-1
Night	
If vehicle has lights/night sensors	-1
If vehicle has no lights/night sensors	-5
Environmental Conditions	
Surface wet	-1
Surface snowy	-2
Surface icy	-4
Severe winds (per 10 km per hour of windspeed)	-1
Terrain versus Vehicle Type	
Ground effect in wood/jungle	-3
Tracked in marsh/swamp	-3
Tracked on road	-1
Tracked in rocky or broken terrain	-1
Tracked in sandy desert	-2
Tracked in wood/jungle	-4
Wheeled in marsh/swamp	-3
Wheeled on road	+0
Wheeled in rocky or broken terrain	-2
Wheeled in sandy desert	-2
Wheeled in wood/jungle	-4
Walker in marsh/swamp	-2
Walker in rocky or broken terrain	-1
Walker in wood/jungle	-3
Marine Pilot Only	
Precipitation (surface travel only)	
Light or Moderate Rain	-1
Heavy Rain	-2
Light Sleet/Snow/Hail	-1
Moderate Sleet/Snow/Hail	-2
Heavy Sleet/Snow/Hail	-3
Visibility	
Each full 50 m < 1 km (fog, smoke, etc)	-1

Tabke 2.1 Vehicle Initiative Modifiers	
Circumstance	Initiative Modifier
Night/Underwater	
If vehicle has lights/night/sonar sensors	-1
If vehicle has no lights/night/sonar sensors	-5
Sea Conditions (surface travel only)	
Each meter of wave height	-1
Each 5 km per hour of wind speed	-1
Air Pilot Only	
Precipitation	
Light or Moderate Rain	-1
Heavy Rain	-2
Light Sleet/Snow/Hail	-1
Moderate Sleet/Snow/Hail	-2
Heavy Sleet/Snow/Hail	-3
Wind Conditions	
Each 10 km per hour of windspeed	-1
Visibility	
Each full 1 km < 10 km (fog, smoke, etc)	-1
Night	
If vehicle has lights/night/radar sensors	-1
If vehicle has no lights/night/radar sensors	-3
Space Pilot Only	
Sensors	
If vehicle has active sensors	+0
If vehicle is relying on passive sensors	-2
If vehicle is flying without sensors	-4
Space Environment	
Asteroid Field	-1 to -10 (vary by density)
Gas Cloud or Nebula	-1 to –5 (density and material)
Gravity well (within ten diameters from ice ball world or large moon or planetoid)	-1
Gravity well (within ten diameters from rock planet, i.e. Earth, Mars, etc))	-2
Gravity well (within ten diameters from small gas giant, i.e. Uranus or Neptune))	-4
Gravity well (within ten diameters from large gas giant, i.e. Jupiter or Saturn))	-7
Gravity well (within ten diameters from a star)	-10

Surprised: When two or more vehicles come upon each other unexpectedly, the SysOp must determine if either is surprised. Anyone actively monitoring sensors (or simply watching the road if driving, etc.) may make either a Signaling: Sensors and Countermeasures or a Perception maneuver as appropriate. The SysOp rolls for the opposing vehicle's crew. The highest roll wins; the losing vehicle crew suffers a -20 penalty to their Initiative

value. A tie results in both vehicle crews being equally surprised, with neither side receiving the modifier. Should one vehicle crew be aware of the other (but not vice versa), then a Surprise check must still be made – if this crew fails the Surprise check, then they do not suffer the Initiative penalty because they were already aware of the other vehicle and essentially "expecting" to come upon the other vehicle. The second unaware vehicle crew would receive the modifier as usual should they fail the roll as they were not expecting to encounter the first vehicle.

SysOp's Choice: Combined Supporting Actions and Attacks

If the SysOp is willing to keep track of the DBs from the prior round, then the supporting actions and the attacks can be combined into the same resolution phase. Crews with higher Initiatives will have the advantage over slower crews in that they will have some knowledge of their opponents' defensive allocations. If this option is used, it is essential that Initiative is rerolled every round.

SUPPORTING MANEUVERS

How well a driver or pilot handles a vehicle can be decisive in combat. Banking at just the right time can bring the target directly into the crosshairs of a waiting gunner; swerving at just the right time can spoil an enemy gunner's aim. Bank or swerve at the wrong time and the advantage can pass to an opponent.

The Driver/Pilot must choose whether they wish to fly offensively (seeking to improve their gunner's OB) or fly defensively (aiming to improve their vehicle's DB) or try to do both at the same time.

A Driver/Pilot must make a vehicular maneuver once per round (or turn), rolling d100 open-ended, adding the relevant driving or piloting skill, and applying all the relevant modifiers from the Vehicle Maneuver Chart, especially the –50 penalty for Combat Driving/Piloting. Note this penalty can be reduced or eliminated using the Combat Styles & Maneuvers (Combat Driving/Piloting) skill. Note also that the vehicle's Maneuverability Rating is not applied to these maneuvers as it is already accounted for in the vehicle's offensive and defensive potentials. If the Driver/Pilot is attempting to drive/fly offensively and defensively at the same time, then a further –20 penalty is applied to the maneuver representing the additional challenge of optimizing for both outcomes. The result is looked up on the Bonus column of the Maneuver Table.

For offensive driving/piloting, all of the result is added or subtracted from the OB of all the vehicle's gunners for that round/turn. For defensive driving/piloting, all of the result is added or subtracted from the DB of the vehicle against all attacks made in that round/turn. If the Driver/Pilot is attempting to drive/fly offensively and defensively at the same time, then half the bonus/penalty must be added or subtracted from the OB of all the vehicle's

gunners for that round/turn and the other half of the bonus/penalty must be added or subtracted from the DB of the vehicle against all attacks made in that round/turn. Note that the vehicle must be moving – a stationary vehicle cannot be offensively or defensively driven/piloted.

In vehicular combat, engineer characters may be trying desperately to repair damage or coaxing the drive engines to provide a fraction more acceleration or exceed their stated maximum speed. These actions can be resolved independently of the vehicle combat. However, engineers can choose to spend their efforts in maximizing shield strength by boosting chosen areas of the force field at the expense of others. A misjudgement can leave the shield dangerously weakened against an incoming attack.

An engineer must make an Engineering (Magnetogravitic) skill maneuver. The difficulty is Medium (+0) in turn-based combat and Hard (-20) in round-based combat, reflecting the balance of considered choices versus instinct in the different time frames. The result is looked up on the Bonus column of the Maneuver Table and the bonus/penalty is applied to the vehicle's DB in that round/turn. If there is more than one attacking vehicle, then the Engineer must choose how to split the bonus/penalty modifier to DB against the enemy vehicles.

To counter sensor-based weapon targeting systems, vehicles can incorporate materials and architecture to passively reduce their profile to detection systems. Electronic countermeasures can provide an active defense by the emission of radio and other interference, confusing enemy sensors. This active Electronic Warfare requires a dedicated communications officer to perform this signal jamming.

The communications officer must make a Signaling skill maneuver. The difficulty is Medium (+0) in turn-based combat and Hard (-20) in round-based combat, reflecting deliberation versus instinctual reactions. The result is looked up on the Bonus column of the Maneuver Table and the bonus/penalty is applied to the vehicle's DB in that round/turn. If there is more than one attacking vehicle, then the communications officer must choose how to split the bonus/penalty modifier to DB against the enemy vehicles.

RESOLVING GUNNERY

Once pilots, engineers, and communications officers have completed their actions, the focus shifts to the gunners. Each weapons system on a vehicle must be operated by a gunner (or a gunnery-capable AI).

Autocannon (projectile cannon), laser cannon, plasma cannon, and particle beam cannon are all resolved using the procedure described below. Missiles and torpedoes are treated separately.

When you want your character to make a gunnery attack, first choose your target and then:

- ☐ Make an attack roll. This is an open-ended percentile roll.

- ☐ If the initial roll is within the fumble range for the weapon, the attack stops and you roll on the fumble table. If the initial roll is within the open-ended range (96-100), you roll again and add the two rolls together. If the second or any other subsequent roll is between 96-100, you roll again and add it to the previous total.

- ☐ Add your character's OB (Offensive Bonus) to the final die result. The OB will be the total of your character's Gunnery skill with the weapon, the Weapons Rating of the weapon, the Maneuverability Rating of the vehicle (if it is moving), any bonus/penalty from the Driving/Piloting maneuver that the pilot declared for offensive piloting, and any Range Modifier for the distance between the two vehicles.

- ☐ Subtract your foe's DB (Defensive Bonus) from the adjusted die total. The DB is the total of the enemy vehicle's Armor Rating, its Shield Rating, its Maneuverability Rating (if it is moving), its Electronic Warfare Rating, any bonus/penalty from the Driving/Piloting maneuver that their pilot declared for defensive piloting, any bonus/penalty from the Engineering (Magnetogravitic) maneuver that their engineer declared against your vehicle, and any bonus/penalty from the Signaling maneuver that their communications officer declared against your vehicle. This is your Total Attack Roll.

- ☐ If the Total Attack Roll is 1 or higher, then you have hit the enemy vehicle. Now adjust your Total Attack Roll by adding or subtracting the size modifier for the weapon that your character is operating. This is your Adjusted Attack Roll.

- ☐ Look up your Adjusted Attack Roll on the proper Critical Table, as determined by the Attack Type for the weapon that you are using. This is the damage that you have done to the foe. All damage is applied immediately.

⚙ SysOp's Choice: Pilot as Gunner

In some settings, the single-person starfighter is an iconic part of the milieu. By HARP SF rules, a character can only perform one action in a round (turn), which makes life difficult for those in single-person craft as they must choose to concentrate on flying or gunnery in any given round (or get an AI to take over one task each round). This option enables pilots to act as both pilots and gunners simultaneously. Pilots can choose to fly offensively, fly defensively or fly while shooting. If they choose to fly while shooting, they must decide how to split any bonus/penalty between an attack and defensive maneuvering, e.g. 50/50, 75/25, etc. They make their Driving/Piloting maneuver and look up the result on the Bonus column. Any proportion of the bonus/penalty declared for DB is applied as in defensive piloting; the rest of the bonus/penalty is then used instead of a Gunnery skill when making the attack. If the pilot has the Natural Gunner Talent, then its bonus is also applied to the attack. Note that this option cannot be used to fire missiles or torpedoes as they require the targeter's undivided attention.

⚙ SysOp's Choice: Offensive and Defensive Maneuvering

For simplicity, the HARP SF rules suggest an equal split between OB and DB bonuses/penalties for driver/pilots who are trying to maneuver both offensively and defensively at the same time. Using this option, driver/pilots may choose alternative splits, i.e. 75/25, 25/75, etc. The decision on the split should be made prior to the maneuver roll and any fractional bonuses/penalties generated by the split rounded down.

RANGE MODIFIERS

Vehicle weaponry does not have an infinite range. Laser beams lose their coherence as they pass through an atmosphere, while plasma and particle beams are absorbed by the atmosphere. Autocannon projectiles are affected by gravity and air resistance. Space is not truly empty, so similar attenuation will occur to weapons fire, albeit over greater distances.

Vehicle weapons have two Range Increment (RI) characteristics, one for use in atmosphere and one for use in space. Howitzers are normally indirect-fire weapons used in atmosphere – if required to use a howitzer in space, it must be operated in a direct-fire mode. For each full Range Increment that a target is from the attacker, the attack roll is modified by -10, up to a maximum of five range increments. For each range increment beyond the fifth, the penalty is doubled.

Table 2.2 lists a number of vehicle weapons and their atmosphere and space Range Increments, as well as their Point Blank (PB) bonus. A Point Blank ranged attack is one directed at a target that is equal to or less than one half of a Range Increment from the attacking vehicle.

In space combat where fighters are moving at high velocities, it is possible for a ship to travel through multiple range increments in a single round or turn. In such cases, the pilot of the vehicle with the highest initiative chooses the minimum distance that he wants to approach the enemy vessels. This determines the Range Increments used by the vehicle's gunners and by their foes against them.

> ✪ **Example:** *Andrew is engaged in space combat with an alien vessel. Andrew's starfighter is armed with laser cannon with a 200 km range increment, while the alien ship relies on a plasma cannon with an 80 km range increment. Whenever Andrew wins the initiative, he keeps a distance of 180 km from the alien craft so that he has no range penalties but the alien suffers a –20 penalty.*

> ✪ **Example:** *Using a standard Mark II laser cannon (with a Range Increment of 400m in atmosphere), Dack has the following modifiers due to range.*
> *0m – 200m   +15 to attack (Point Blank)*
> *201m – 400m   +0 to attack (RI 0)*
> *401m – 800m   -10 to attack (RI 1)*
> *801m – 1200m -20 to attack (RI 2)*
> *1201m – 1600m   -30 to attack (RI 3)*
> *1601m – 2000m   -40 to attack (RI 4)*
> *2001m – 2400m   -50 to attack (RI 5)*
> *2401m –2800m   -100 to attack (RI 6)*
> *2801m – 3200m   -200 to attack (RI 7)*

> ✪ **Example:** *Using a standard Mark II laser cannon (with a Range Increment of 200 km in space), Dack has the following modifiers due to range.*
> *0m-100km   +15 to attack (Point Blank)*
> *100.001-200km   +0 to attack (RI 0)*
> *200.001km-400km   -10 to attack (RI 1)*
> *400.001km-600km   -20 to attack (RI 2)*
> *600.001km-800km   -30 to attack (RI 3)*
> *800.001km-1000km   -40 to attack (RI 4)*
> *1000.001km-1200km   -50 to attack (RI 5)*
> *1200.001km-1400km   -100 to attack (RI 6)*
> *1400.001km-1600km   -200 to attack (RI 7)*

A Point Defense System is normally used to protect a vehicle from incoming missiles and torpedoes. The battery of miniature weapons that forms the system can be used collectively as a "normal" vehicle weapon system, in which case it delivers dual Tiny Vehicle Energy and Piercing criticals, albeit at a limited range.

✪ SysOp's Choice: Hit Locations and Called Shots

After determining the Adjusted Attack Roll, you can refer to the following Vehicle Critical Hit Location Table to determine which area of the enemy vehicle has been hit, and so identify which subsystems (if any) have been damaged or destroyed. Use the "ones" die from the attack roll. If the result was open-ended, then use the "ones" result of the final roll.

Table 2.3 Vehicle Critical Hit Location Table	
"Ones" die result	Hit Location
0-2	Hull
3-4	Weapons System
5-6	Motive System
7	Control System
8	Power System
9	Crew Module

> ✪ **Example:** *Latham has just blasted a Silth starfighter with a laser cannon. Her player rolled 47 on the percentile dice, which means that she has struck the starfighter's control system. The critical result indicates that one subsystem is destroyed and another subsystem is damaged. The SysOp interprets this result as the starfighter has lost its communications subsystem (so it has lost its Electronic Warfare Rating) and that the onboard computer has performed an emergency shutdown. Blue screen of death.*

Table 2.2 Vehicle Weapon Range Table						
Weapon	Attack Size	Atmosphere Range Increment	Atmosphere Point Blank	Space Range Increment	Space Point Blank	PB
Autocannon (Mark I)	Tiny	400m	200m	60km	30km	+15
Autocannon (Mark II)	Small	800m	400m	120km	760km	+20
Autocannon (Mark III)	Medium	1200m	600m	180km	90km	+25
Autocannon (Mark IV)	Large	1600m	800m	240km	120km	+30
Autocannon (Mark V)	Huge	2000m	1000m	300km	150km	+35
Howitzer (Mark I)	Tiny	2km	1km	100km	50km	+15
Howitzer (Mark II)	Small	3km	1.5km	150km	75km	+20
Howitzer (Mark III)	Medium	4km	2km	200km	100km	+25
Howitzer (Mark IV)	Large	5km	2.5km	250km	125km	+30
Howitzer (Mark V)	Huge	6km	3km	300km	150km	+35
Laser Cannon (Mark I)	Tiny	200m	100m	100km	50km	+15
Laser Cannon (Mark II)	Small	400m	200m	200km	100km	+15
Laser Cannon (Mark III)	Medium	600m	300m	300km	150km	+20
Laser Cannon (Mark IV)	Large	800m	400m	400km	200km	+20
Laser Cannon (Mark V)	Huge	1000m	500m	500km	250km	+25
Particle Beam Cannon (Mark I)	Tiny	100m	50m	60km	30km	+20
Particle Beam Cannon (Mark II)	Small	200m	100m	120km	60km	+20
Particle Beam Cannon (Mark III)	Medium	300m	150m	180km	90km	+25
Particle Beam Cannon (Mark IV)	Large	400m	200m	240km	120km	+25
Particle Beam Cannon (Mark V)	Huge	500m	250m	300km	150km	+30
Point Defense System	Tiny	200m	100m	50km	25km	+10
Plasma Cannon (Mark I)	Tiny	100m	50m	40km	20km	+20
Plasma Cannon (Mark II)	Small	200m	100m	80km	40km	+25
Plasma Cannon (Mark III)	Medium	300m	150m	120km	60km	+30
Plasma Cannon (Mark IV)	Large	400m	200m	160km	80km	+35
Plasma Cannon (Mark V)	Huge	500m	250m	200km	100km	+40

Characters may choose to perform a "called shot", hitting a specific area of a vehicle. This is accomplished using the following option. Before the attack roll is made, the character must announce the location he is attempting to hit.

Characters making called shots must subtract 10 from their OB in order to adjust the location amount by +/- 1 point. A character may reduce his OB by decrements of 10 to gain a maximum of +/- 5 points to indicate the desired location. When the Adjusted Attack Roll is calculated, the character can refer to the Vehicle Critical Hit Location Table and adjust the result by the called shot modifier in the direction of the desired location.

❷ **Example:** *Latham wants to take out the drive of a Silth gunboat, so announces that she'll be targeting the Motive System. She reduces her OB by 20 to give her a +/- 2 hit location adjustment in her favor. The attack roll is 72. She needs a result of 5 or 6 to hit the drive. The adjusted location is only a 4, so Dack blasts their weapons systems instead.*

❷ SysOp's Note: Weapon Placement and Facing

For ease of play, the rules in this chapter make no assumptions about the placement and facing of weapon systems on vehicles. Essentially the rules assume that by some combination of aiming a weapon system and adjusting the orientation of the vehicle, a gunner can engage any target at any point on 360 degrees of all three axes. This is a significant simplification and abstraction of reality, and will be hard to justify for many types of vehicles and their associated weapon systems. SysOps may wish to specify what is feasible for particular weaponry on a specific vehicle – as always, it will be best to point out limitations to players before any combat begins to avoid arguments.

COMBAT EXAMPLE – PART ONE

The scoutship, Faffin' Around, and its crew of six PCs have discovered a hidden Silth base orbiting a red dwarf sun. The Faffin' Around is decelerating from 0.01c as it enters the debris field of the exit Lagrange Point of the system. Alice Weaver has just detected two Silth starfighters, one at 800 km distance and one at 15,000 km. Unfortunately, both Silth starfighters have detected the Faffin' Around. Combat begins.

In round one, initiative is rolled for the three pilots. The near starfighter pilot, Ssadelask, wins initiative with 25, followed closely by Seraph on 24, and the distant pilot Ssevetosh lags on 21.

Ssadelask chooses to fly defensively, rolls 85, adds 70 for skill, but then must subtract 40 for maximum acceleration and 10 for combat piloting (as Ssadelask's Combat Pilot style is only 40), giving 105 which translates to a +5 bonus to the vehicle's DB.

On the Faffin' Around, Seraph opts to fly offensively, knowing that her Instinctive Evasion talent will give the scoutship a +20 bonus to DB. The roll is 67, plus 90 for skill, minus 40 for maximum acceleration (but no combat piloting penalty), so 117, which is a +10 bonus to all attacks. Dack makes an Engineering (Magneto-gravitic) maneuver to boost the shields. A roll of 74, plus 50 for skill, minus 20 for being a Hard maneuver, is 104 or +5 bonus to shields. Dack chooses to apply this against the nearest starfighter. Finally Weaver tries her hand at electronic countermeasures to defend against any missile launches from the other starfighter, which is too distant to use its laser cannon. The roll is 7, Weaver's Signaling skill is only 40, and the penalty is 20, so net result of 27, or a –40 penalty to DB against the distant starfighter.

Ssevetosh sends an emergency message pulse to the Silth base instead of fancy maneuvering.

Now the shooting begins.

Ssavarka (Ssadelask's gunner) opens up on the Faffin' Around with his Mark II laser cannon. His OB is 66 (from the roll), plus 70 from skill, plus 20 from Weapons Rating, plus 20 from the vehicle's Maneuverability Rating, but minus 30 (for four Range Increments), equaling 146.

The Faffin' Around's DB is 30 (from Armor), 20 (from Shields), 20 (from EW), 20 (from Maneuverability Rating), plus 20 from Seraph's talent and 5 from Dack's shield handling, which is a grand total of 115. Total Attack Roll is 31, adjusted for Small attack to 21. That's a hit on one of the Faffin' Around's weapon systems (the SysOp chooses Latham's autocannon) – it is damaged with a –20 penalty and the ship has lost 5 Structural Hits.

Latham returns fire with a Mark III autocannon. Her OB is 128 (open-ended roll of 98 followed by 30), plus 80 for skill, 10 for Weapons Rating, 20 for Maneuverability Rating, and 10 from Seraph's flying, minus 20 from damage penalty and minus 40 for Range Increment 5. Total is 188.

The starfighter's DB is 30 (Armor), 15 (Shields), 10 (EW), 20 (Maneuverability), and 5 (defensive piloting). Grand total is 80. Total Attack Roll is 108. No adjustment for attack size, but the damage cap lowers it to 100. That's 22 Structural Hits and a disabled EW system.

Hamilton follows up with laser fire. His OB is 74 (from roll) plus 80 (skill), 10 for Weapons Rating, 20 for Maneuverability Rating, and 10 from Seraph's flying, minus 30 for Range Increment 3. Total is 164.

The starfighter's DB is now 70 because the electronic warfare system is out. Total Attack Roll is 94, but this is lowered by 10 for Small attack, so 84. Looking that up on the Vehicle Energy table

indicates 12 Structural Hits and the loss of a weapons system. The SysOp rules that the Silth's laser cannon is disabled.

The gunner of the other starfighter decides to fire all his missiles in a single salvo. The missiles will take 3 rounds to arrive, with the next round being their first round of travel. (See the second part of this example for the resolution of this gunnery action.)

In round two, Seraph wins the initiative. Latham manages to disable the starfighter's missile launching system, depriving them of all offensive potential, while Hamilton burns through into their cockpit, engulfing pilot and gunner in an intense fire. This starfighter and its crew are out of the battle. The other starfighter spends the round heading towards the Faffin' Around at maximum acceleration with six missiles racing ahead.

❯ RESOLVING MISSILES AND TORPEDOES

Missiles and torpedoes are self-propelled weapons systems. Once they have locked onto and been launched at a target, they will follow the path to that target of their own volition. They are not instant weapons as it may take seconds, minutes, even hours for them to reach their target depending on the range and the velocity of the missiles. While they are in transit, they can be outrun or dodged breaking their lock, confused by electronic countermeasures or decoys, or simply destroyed by main weapon and point defense systems. If, however, they do reach their target, then they release their damage potential up close and personal, typically in the form of a very large explosion.

Gunners can choose to fire a single missile at a target or a salvo of multiple missiles (equivalent to burst fire with personal weapons) using the same attack roll. Salvos are harder to defend against; this increases the likelihood that one or more will reach the target and the potential damage that may be inflicted. However, it is not possible to make called shots with missiles against mobile targets.

To lock onto a target, the gunner must first have an approximate location for the target. Typically this will require a successful use of the vehicle's sensor suite/sensor system by the vehicle's communications officer and the feeding of the data to the weapons systems. The communications officer makes an All-or-Nothing Signaling maneuver, subtracting any range penalty for distance (see below), -40 (if the target(s) have magneto-grav shields up), +20 (if the scan is focused in a particular area/volume), and +20 (if the scan is limited to a particular type of target or information). If the result is 101 or more, then the comms officer has identified the silhouettes of any vessels in the scanned area and this will normally be sufficient for most gunners! Once detected, the sensor suite or sensor system will be able to track targets without further intervention from the comms officer.

In space, sensor suites and sensor systems have characteristic Range Increments at the three technology levels as given in the table below. For each full Range Increment that the target is from the sensor, the sensing maneuver is modified by –10 up to five range increments. For each range increment beyond the fifth, the penalty is doubled. The Range Increments for different technological stages are given in the table below (1 light second = 300,000 km, 1 astronomical unit (au) = 150,000,000 km or 500 light seconds). When one of these suites or systems is "planetbound", i.e. landed on the surface of a world or in an atmosphere, the maximum

"horizontal" range will be the distance to the horizon - looking "up" is not subject to this range limit.

Type	Early RI	Mature RI	Advanced RI
Construct Sensor Suite	1 km	2 km	5 km
Construct Sensor System	0.5 Light Seconds	1 Light Second	2 Light Seconds

Full rules for using sensor suites and systems can be found in HARP SF, Adventuring chapter, Sensors, Scanners, and Countermeasures.

Having acquired potential targets, when you want your character to make a missile or torpedo attack, first choose your target, second decide how many missiles you want to fire (one or a salvo), and then:

☐ Make an attack roll to lock onto the enemy target. This is an open-ended percentile roll.

☐ If the initial roll is within the fumble range for the weapon, the attack stops and you roll on the fumble table. If the initial roll is within the open-ended range (96-100), you roll again and add the two rolls together. If the second or any other subsequent roll is between 96-100, you roll again and add it to the previous total.

☐ Add your character's OB (Offensive Bonus) to the final die result. The OB will be the total of your character's Gunnery skill with the weapon, the Weapons Rating of the weapon, the Maneuverability Rating of the vehicle (if it is not stationary) and any bonus/penalty from the Driving/Piloting maneuver that the pilot declared for offensive piloting. Do not apply any Range Modifiers.

☐ Subtract your foe's DB (Defensive Bonus) from the adjusted die total. This DB is the total of the enemy vehicle's Armor Rating, its Shield Rating, its Maneuverability Rating (if it is not stationary), its Electronic Warfare Rating, any bonus/penalty from the Driving/Piloting maneuver that their pilot declared for defensive piloting, any bonus/penalty from the Engineering (Magnetogravitic) maneuver that their engineer declared against your vehicle, and any bonus/penalty from the Signaling maneuver that their communications officer declared against your vehicle. This is your Total Attack Roll.

☐ If the Total Attack Roll is 1 or higher, then you have successfully locked onto the enemy vehicle and your missiles are even now racing to a fiery rendezvous with the foe. If the Total Attack Roll is 0 or less, you failed to achieve a lock on the target, and your missiles are not launched.

Determine how long the missiles will take to reach their target. The round (or turn) in which they were fired does not count for calculating when a missile will strike its target – travel time starts in the following round (or turn).

Each round (or turn), the pilot of the enemy vehicle may attempt to dodge the missiles to break their lock (see below).

Each round (or turn), any bridge officer of the enemy vehicle may release decoys to fool the missiles (see below).

Each round (or turn), the enemy communications officer may attempt to jam the missiles' targeting sensors to break their lock (see below).

Each round (or turn), gunners may attempt to destroy missiles using the main weapon systems (see below).

In the final round (or turn) only, an enemy gunner may attempt to destroy the surviving missiles using the point defense system (see below)

If any missiles penetrate the defenses, make a d100 open-ended roll, adding 10 for each missile beyond the first, adding any bonus from the missile's (not launcher's) Weapons Rating (only count the Weapons Rating once) and subtracting the enemy vehicle's Armor Rating and Shield Rating. Adjust the result by adding or subtracting the size modifier for the particular missile type. Look this final value up on the Warhead Critical Table. This is the damage that you have done to the enemy. All damage is applied immediately.

⊗ SysOp's Choice: Nuclear Warhead Lethality

If a vehicle without active shields is hit by a missile with a nuclear warhead, then the SysOp is entitled to rule that the unfortunate vehicle is completely destroyed with no survivors. This optional rule simulates the true deadliness of nuclear weapons against normal matter.

⊗ Dodging Missiles by Better Flying

A pilot can attempt to dodge incoming missiles by inspired flying, making unexpected directional changes. The pilot's player makes an All-or Nothing vehicular maneuver, rolling d100 open-ended, adding the relevant driving or piloting skill, and applying all the relevant modifiers from the Vehicle Maneuver Chart, especially the –50 penalty for Combat Driving/Piloting. In addition, a further –10 penalty for each missile to be dodged is applied.

If the result is 101 or more, then at least one missile has been successfully dodged. For every full twenty points of success over 101, an additional missile has been dodged, i.e. 101 equals 1 dodged, 121 equals 2 dodged, 141 equals 3 dodged, etc.

In any round (or turn) that a pilot tries to dodge missiles, he cannot also attempt to improve OB or DB.

⊗ Dodging Missiles by Decoys

Any bridge officer (including communications officers and weapons officers, not just pilots) can attempt to fool incoming missiles into following another spurious target by releasing a decoy that emits electromagnetic radiation identical to the real vehicle. Any missiles that are fooled by a decoy lock onto it and destroy the decoy instead of the real target. Pilots will be most adept at deploying decoys, but may be busy with more important issues.

To resolve a decoy deployment, the officer's player makes an All-or Nothing vehicular maneuver, rolling d100 open-ended, adding the relevant driving or piloting skill, and applying all the relevant modifiers from the Vehicle Maneuver Chart, especially the –50 penalty for Combat Driving/Piloting and any bonus/penalty from the vehicle's Maneuverability Rating. In addition, a further –10 penalty for each missile to be decoyed is applied, but a bonus of +10 is awarded for every additional decoy after the first is deployed (+0 for 1 decoy, +10 for 2 decoys, etc.).

If the result is 101 or more, then at least one missile is now locked onto the decoy(s). For every full twenty points of success over 101, an additional missile has been fooled, i.e. 101 equals 1 fooled, 121 equals 2 fooled, 141 equals 3 fooled, etc.

In any round (or turn) that an officer tries to deploy a decoy, he cannot also attempt to improve OB, DB, dodge missiles, fire weapons or perform other actions.

⁚ **Note:** Ships will have a finite number of decoys. Shuttles usually carry up to six, freighters and scoutships perhaps a dozen, while a naval corvette would be equipped with twenty. (Starfighters are too small to have decoys.) Each decoy is about the same size and price as a maintenance pod. Use them wisely.

⁚ **Note:** The electromagnetic signature of a decoy can be changed with a Medium (+0) Signaling skill maneuver to the pattern of another vehicle. The process takes one minute and can only be accomplished prior to the decoy's launch. If the signature is not already stored, then it can be determined by performing a successful "Analyze Electronic Warfare" task using appropriate sensors to probe the other vehicle (see HARP SF, Adventuring chapter, Sensors, Scanners and Countermeasures).

⊗ Countering Missiles by Jamming

The communications officer can use electronic warfare measures to confuse incoming missiles. This is resolved by an All-or-Nothing Signaling skill maneuver, adding the EW Rating of the vehicle. The difficulty is Medium (+0) in turn-based combat and Hard (-20) in round-based combat. A penalty of –10 is applied for each incoming missile.

If the result is 101or more, then at least one missile has lost its lock. For every full twenty points of success over 100, an additional missile has been confused, i.e. 101 equals 1 fooled, 121 equals 2 fooled, 141 equals 3 fooled, etc.

In any round (or turn) that a communications officer attempts to counter missiles, he cannot also attempt to improve the vehicle's DB against other attacks.

Electronic warfare measures can also be used to disrupt missiles launched at other targets using the same procedure outlined above, with a more severe difficulty of Hard (-20) in turn-based combat and Very Hard (-40) in round-based combat.

In terms of jamming range, if a missile can be detected by the vehicle's sensors, then attempts can be made to jam the missile.

⊗ Destroying Missiles by Main Weapons Systems

It is possible to retask the main weapon systems to target incoming missiles. This is resolved by an All-or-Nothing Gunnery skill maneuver (which is Very Hard (-40) in round-based combat and Hard (-20) in turn-based combat), and applying the appropriate range penalty. If the result is 101 or more, then one and only one missile is destroyed. Each weapon system can only target one missile each round (or turn).

Using the main weapons systems in this fashion usually only makes sense if a vessel is under missile bombardment from a craft that is out of range of the vessel's weapons.

⊗ Destroying Missiles by Point Defense

This is the last line of defense against missiles – the battery of microlasers and mini-autocannon that seek to shred the oncoming warheads into harmless fragments. It is the task of the gunner in charge of the point defense system to configure the firing pattern to maximize its defensive coverage.

This is resolved by an All-or-Nothing Gunnery skill maneuver (which is Hard (-20) in round-based combat and Medium (+0) in turn-based combat), adding the Point Defense Rating of the vehicle, and subtracting 10 for every incoming missile.

If the result is 101 or more, then at least one missile has been destroyed. For every full twenty points of success over 100, an additional missile has been eliminated, i.e. 101 equals 1 blown up, 121 equals 2 destroyed, 141 equals 3 eliminated, etc.

> **Note:** Point defense systems are only usable on the last round (or turn) before impact due to the relatively short range of the microlasers and mini-autocannon.

> **Note:** It is possible to use a point defense system to destroy missiles intended for another target if the missiles pass within Range Increments 0 to 5 of the point defense system. This increases the difficulty of the Gunnery skill maneuver to Very Hard (-40) in round-based combat and Hard (-20) in turn-based combat.

⊗ Outrunning Missiles

It is possible, albeit difficult, to outrun a missile. While their propulsion systems are much smaller than those of a starship, a missile has a much smaller mass to move, does not have to waste power on life support etc., and can accelerate at rates and to speeds that would leave a living crew a radioactive bloody smear even with gravity control and shielding. Missiles with magnetic-gravitic drives can track a target across a solar system, making them tenacious opponents.

If a missile salvo is launched at relatively long range, then a starship may be able to maintain sufficient distance between it and the missile(s) until either the missiles burn out from exhausting their fuel or the starship reaches a position where it can make a hyperspace jump.

⊗ SysOp's Note: Finding New Targets, Smart Missiles and Guided Missiles

Normally when a missile loses the lock on its target due to jamming, it is effectively out of the battle. In certain situations where the tactical environment is rich in similar targets to the one that successfully jammed the missile (such as a large space battle with multiple vessels involved), a successfully jammed missile may potentially lock onto another similar target in the next round (or turn) after being jammed. A similar target will be a vehicle of the same class, or approximately equivalent size or shape, or a decoy pretending to be the intended target. Roll d100 open-ended, and add +5 for every similar target in the tactical environment. If the result is 101 or more, then the missile has found a new target (the SysOp may choose or roll randomly). A missile may only switch target once in this way.

A smart missile has a full set of onboard targeting software and associated sensors. Effectively the software provides the equivalent of a number of skill ranks in Signaling, enabling a jammed missile to restore its lock on an original target if it succeeds in a Signaling maneuver (at Hard (-20) in round-based and Medium (+0) in turn-based combat.). The software may only attempt to restore lock in the round/turn after being successfully jammed. The cost of a smart missile is twice the normal base cost of an equivalent dumb missile plus the cost of the software (use the cost for a Skill Expertise cyberware package) and its mass increases by 10%.

A guided missile is a smart missile further enhanced with additional telemetry and a two-way communications link back to its launching platform. The remote gunner or signaling officer can receive information about the missile's status from it and in turn retask the missile to lock onto a different target, relock onto the original target, or even detonate the missile harmlessly before it reaches its intended target. A guided missile can be retasked up to twice by remote control. To remotely direct a guided missile, the gunner or comms officer must first make a Signaling maneuver (as described above for acquiring targets) and then make a new attack roll for the missile (again as described above for missile/ torpedo attack resolution). Enemy EW officers can attempt to jam communications links between guided missiles and their operators, if they are also within one light second of any vessel in the battery (for space-based engagements) or within line-of-sight (for planet-bound engagements). The comms officer for the guided missile makes a Signaling maneuver, adding the EW Rating of his vessel, and applying any range penalties. The result is looked up on the RR column of the Manuever Table. The jamming EW officer must then make a Signaling maneuver, adding the EW Rating of his vessel, and compare the result against the target value from the guided missile's comms officer. Equal or exceed the target number and all communication between the remote operator and the guided missile(s) is disrupted for the next round/turn. An EW system used for disrupting missile communications in a given round/turn cannot be used for any other tasks. The cost of a guided missile is three times the normal base cost of an equivalent dumb missile plus the cost of the software (use the cost for a Skill Expertise cyberware package) and its mass increases by 20%. SysOps should be aware of lightspeed lag for guided missiles over interplanetary distances and the opportunities for enterprising hackers to reprogram the guidance systems.

⊗ SysOp's Note: Acting as a Decoy for Another

A craft can choose to simulate the electromagnetic signature of another vessel, in essence serving as an over-sized decoy. The most sensible time to do this is prior to a missile launch against the vessel that must be protected. The decoy's comms officer needs to know the signature of the vessel, which may be in a data bank or can be ascertained using a successful "Analyze Electronic Warfare" task with appropriate sensors to probe the vehicle (see **HARP SF**,

Adventuring chapter, Sensors, Scanners and Countermeasures). The decoy's comms officer then must succeed in a Hard (-20) Signaling maneuver to simulate the desired signature – this process takes one minute and requires the decoy to have a functioning electronic warfare system – and while the signature is being changed, the EW system cannot be used for any other purpose. Unless the hostiles perform their own electronic warfare analysis (or have optical observation on both vessels), the decoy will seem to be identical to the protected vessel. (Of course, the comms officers on the protected vessel should be masking or distorting their signature). Vessels who are acting as decoys can choose to revert to their normal signature at any time (the process takes one minute and the EW system may not be used for any other purpose during this period) and automatically revert if the disguising EW system is disabled or destroyed. Any missile locked onto a decoy vessel automatically loses lock if the signature reverts. While using a decoy signature, increase the difficulty degree of all Signaling maneuvers by one step (so Medium becomes Hard, etc.)

COMBAT EXAMPLE – PART TWO

Returning to our combat example, prior to the engagement Ssunihamar, (Ssevetosh's gunner) used his Signaling skill to detect the Faffin' Around. His roll was 94, plus Signaling skill of 69, +0 for range (the Faffin' Around is a fraction of one light-second away from the starfighter), -40 (the Faffin' Around has its shields up), +0 for unlimited area of scanning (Ssunihamar is not focusing his scan), and +0 for unfocused scanning (Ssunihamar is looking for all ships and anything else unexpected). Result is 123, easily exceeding the 101 target number for detecting ship silhouettes and ensuring that Ssunihamar's targeting computer has the location of the Faffin' Around.

In round one Ssunihamar launched a full salvo of six missiles at the Faffin' Around. Ssunihamar's OB is 39 (from roll), plus 60 (skill), plus 20 (missile launcher's Weapons Rating), and 20 (Maneuverability Rating), so a total OB of 139. Against the missile

lock, the Faffin' Around has a DB of 30 (from Armor), 20 (from Shields), 20 (from EW), 20 (from Maneuverability Rating), plus 20 from Seraph's talent but –40 from Weaver's failure in the Signaling maneuver, which is a grand total of 70. Total Attack Roll is 69 (139-70), so the missiles lock on.

The SysOp calculates that they'll traverse the fifteen thousand kilometers in under 5 seconds.

In round two, the crew of the Faffin' Around concentrate on taking out the other starfighter, so the missiles fly on.

In round three, the Faffin' Around decides to break the missile lock. Seraph attempts some evasive flying, but only gets 32 on the dice roll, adding 90 for skill and 20 for the Faffin' Around's Maneuverability Rating, but subtracting 40 for vehicle penalties and 60 (-10 for each missile), so a net result of 42. Weaver redeems herself in jamming the missiles with a roll of 169 (open-ending on a 96 followed by a 73), plus skill of 40 and 20 (EW Rating), minus 20 (for Hard difficulty) and minus 60 (for six missiles). Net result is 149 and three missiles become confused.

In round four, the Faffin' Around has to contend with three missiles and the starfighter itself. Seraph flies defensively, leaving Weaver and Jung (on point defense) to confuse or destroy the missiles.

Weaver gets a roll of 61, plus 40 (skill) and 20 (EW Rating), minus 20 (difficulty) and 30 (for remaining missiles), so result is 71, nowhere near enough.

It's all up to Jung. His player rolls 66, adds 65 (skill) and 20 (Point Defense Rating), minus 50 (Hard difficulty and 3 missiles), so net result of 101. One missile is shredded, the other two detonate.

On behalf of the Silth, the SysOp rolls 77, adds 10 (for second missile), adds +10 (these missiles have +10 Weapons Rating), subtracts 50 (for Faffin' Around's Armor and Shields), subtracts 20 (as Type I warheads are Tiny size), and looks up 27 on the Warhead Table. Only 8 more structural hits and damage to the electronic warfare system. The Faffin' Around was lucky.

⚙ SysOp's Choice: Multiple Salvos and Separate Launches

The advantage of launching multiple missiles in a single salvo is that they are much harder to defend against. The disadvantage is that if the initial gunnery maneuver fails to lock on to the target, the entire salvo is wasted.

What happens when a ship is targeted by multiple salvos, either from a single hostile or multiple enemy vessels? The SysOp must decide whether or not each salvo is treated separately for the purposes of dodging, decoys, electronic countermeasures, and point defense. If each salvo is treated as a separate attack, then it will be easier to protect a ship from an individual salvo because fewer missiles means reduced penalties. The disadvantage is that each defensive action can only take on one salvo at a time, so a really lucky roll will not eliminate all the opposition.

LINKED-FIRE SYSTEMS

Modern vehicular weapons can be linked together via computer control such that a single gunner can fire multiple weapons simultaneously at a single target. A linked-fire system consists of two or more identical vehicular weapons connected by a suitable communications and computing network. The weapons must be identical, i.e. they must be of the same type, same attack size, posssess the same bonuses, etc., i.e. two Tiny Laser Cannons could form a linked-fire system, but neither a Small Laser Cannon nor a Tiny Particle Beam Cannon could be added to the system. Damage to a weapon that imposes a penalty, or disables it or destroys it, will remove the weapon from a linked-fire system.

To use a linked-fire system, the gunner makes one attack roll as normal using the appropriate Gunnery skill. If the attack succeeds, i.e. the Total Attack Roll is 1 or more, then for every additional weapon (after the first) in a linked-fire system, add +5 to the Total Attack Roll when calculating the Adjusted Attack Roll. Moreover for every five weapons in a linked-fire system, increase the damage cap by 10 to a maximum of 120.

> ⚙ **Example:** *Thornhill is using a linked-fire system of five Small Laser Cannon installed on an experimental frigate that the crew of the Faffin' Around have captured from space pirates. More raiders are approaching in an assault shuttle. Thornhill opens up on the assault shuttle, and thanks to a very lucky roll manages to hit. The Total Attack Roll is 83. Adjusting for attack size (-10 for Small) and linked-fire bonus (+20 for four additional laser cannons), gives an Adjusted Attack Roll of 93 (83 –10 + 20). Normally Small weapons have a damage cap of 90, but the linked-fire system has five weapons, so the actual damage cap is 100, so Thornhill's result of 93 stands.*

WEAPON BATTERIES

An alternate to a linked-fire system is a weapon battery, where a set of identical vehicular weapons, each with its own individual gunner, coordinates their fire on a single target. All of the weapon systems in a battery need to share communications and targeting information – this need not be high-tech, e.g. on a sailing ship, an officer shouting instructions to individual gun captains would count as appropriate coordination for a broadside. The weapons must be identical, i.e. they must be of the same type, same attack size, posssess the same bonuses, etc., i.e. two Tiny Autocannons could form a battery, but neither a Small Autocannon nor a Tiny Particle Beam Cannon could be added to the battery. Damage to a weapon that imposes a penalty, or disables it or destroys it, will remove the weapon from the battery.

To resolve an attack by a weapon battery, make one attack roll using the highest Gunnery skill of the gunners crewing the battery. Apply all normal bonuses and penalties as usual and then add the following battery bonus: for every additional weapon in the battery, add +5 to the OB. In addition for every five weapons in the battery, increase the damage cap by 10 points to a maximum of 120.

> ⚙ **Example:** *Sergeant Latham is commanding a battery of six Tiny Autocannons. She is the most skilled gunner present, so her Gunnery skill of 102 will be used to resolve attacks by this battery. The battery bonus is +25 (five additional autocannon), so her modified Gunnery skill is 127. The damage cap for the battery is also raised from 80 to 90.*

EXTENDED WEAPON BATTERIES AND COUNTERMEASURES

A weapon battery can consist of weapon systems on multiple vessels if the vessels can maintain appropriate communications and telemetry links without time lag. This is typically only possible with speed-of-light communications (e.g. radio and comm lasers) with all vessels within one light second (300,000 km) of each other. Potentially quantum entanglement methods (such as psionics) might work enabling much longer ranges. Note that an extended weapon battery uses the worst Range Increment of all included weapon systems when resolving attacks so linking in very dispersed vehicles will typically be counter-productive.

Maintaining an extended weapon battery is a task for the comms officer. If there is no interference (i.e. opposing ships trying to jam the links), then the comms officer makes an All-or-Nothing Signaling maneuver (Medium (+0) in turn-based combat, Hard (-20) in round-based combat) with a penalty of –10 for each additional vessel after the first two in the extended weapon battery. Success means that the comms officer holds the link open for that round/turn.

The EW officers on opposing vehicles may try to disrupt the extended battery communications, if they are also within one light second of any vessel in the battery (for space-based engagements) or within line-of-sight (for planet-bound engagements). The comms officer for the battery makes a Signaling maneuver, adding the EW Rating of his vessel, and applying a penalty of –10 for each additional vessel after the first two in the battery. The result is looked up on the RR column of the Manuever Table. The attacking EW officer must then make a Signaling maneuver, adding the EW Rating of his vessel, and compare the result against the target value from the defending comms officer. Equal or exceed the target number and the extended battery is disrupted for the next round/turn. An EW system used for disrupting battery communications in a given round/turn cannot be used for any other tasks.

❽ **Example:** *Alice Weaver has been tasked with coordinating an extended weapons battery across four Federation scoutships, which are currently engaged in a vicious space battle with two Silth cruisers. One of the Silth EW officers, Ssadinuaik, is using a secondary EW system to jam Alice's battery linkages. Alice's player rolls 75, adds 40 (Signaling skill), adds 20 (EW Rating of Faffin' Around), and subtracts 20 (4 vessels in battery means –20 penalty), yielding a result of 115, which from the RR column of the Maneuver Table gives a target of 130. The SysOp rolls on behalf of Ssadinuaik, getting a miserly 13 on the roll, plus 82 (Signaling skill) plus 10 (EW Rating), for a total of 105. Weaver's battery comms network holds for the next round, but her luck cannot last.*

⚙ SysOp's Choice: Variable Battery Bonuses

The weapon battery rules give a flat +5 bonus per additional weapon regardless of the skill of the subordinate gunners. This option accounts for veterans and rookies in a battery crew. For each subordinate gunner, divide his Gunnery skill by 10, rounding down, and use the result as his contribution to the battery bonus.

> ⊞ **Example:** *Returning to Latham's command, her subordinates are a senior corporal (Gunnery skill 84), a veteran (Gunnery 68), and three rookies (Gunnery skills of 39, 36 and 32 respectively). Dividing the Gunnery skills by 10 and rounding down gives bonuses of 8 + 6 + 3 + 3 + 3 for a total battery bonus of +23.*

FIGHTING IN FORMATION

Vehicles with crews who have trained together can combine to fight in specialized formations known as "wings". A "wing" can consist of identical vehicles such as a flight of starfighters or a more varied task force, such as a naval squadron with cruisers, frigates, carriers, etc. By coordinating their maneuvers and attacks, the "wing" can concentrate its fire on an opponent vehicle and protect themselves from incoming fire by overlapping their shields, electronic warfare and point defense systems. A "wing" typically consists of two to four vehicles (but can be larger) and is considered as a single unit for resolving vehicle combat (making it easier for SysOps to manage larger-scale battles). The maximum size of a wing is limited by the skill of the individual drivers/pilots and the Maneuverability Ratings of the vehicles involved. All vehicles in a wing must move and fight closely together (i.e. be in the same Range Increment for wing attacks, be travelling in the same direction, etc.). The vehicles in a wing do not have to attack the same target – gunners in vehicles may choose to attack independent targets, to form one or more extended weapon batteries (see above), or make a wing attack (when it is not possible to form an extended weapon battery).

For a specific vehicle and driver/pilot combination, the sum of the driver/pilot's appropriate vehicle skill (Driving, Space Pilot, etc.) and the vehicle's Maneuverability Rating must exceed the formation penalty of the wing (-5 per additional vehicle in the wing after the first). Should a vehicle incur a penalty to its Maneuverability Rating or its driver/pilot suffer a penalty from injuries, the combination might have to drop out of the wing until damage is repaired or injury healed.

> ⊞ **Example:** *Maria is a newly commissioned Belter Navy pilot with a skill of 47 in Space Pilot. In an antiquated training starfighter (Maneuverability Rating 0), the maximum size of a wing that she can join is 10 (which has a formation penalty of −45 for nine vehicles after the first.) In a sleek modern Tiberius-class starfighter with a Maneuverability Rating of 10, the total of her skill and the vehicle's Rating is 57, enabling the combo to fly in formations of up to 12 vehicles.*

Use all the normal rules for vehicle combat with the following modifications:

Make one Driving/Piloting maneuver for the whole wing using the highest Driving/Piloting skill within the wing. For every additional vehicle in the wing (after the first), apply a –5 penalty. (This is the formation penalty)

Where appropriate, make one Engineering (Magneto-gravitic), one Signaling and one point-defense Gunnery maneuver for the whole wing using the highest respective skills.

When making a "wing" attack, make one attack roll for the whole wing using the appropriate highest Gunnery skill and add +5 to the OB for every additional vehicle in the wing (after the first). In addition for every five vehicles in the wing, increase the damage cap of the weapons by 10 points to a maximum of 120.

For every additional vehicle (after the first) in the wing, add +5 to the Shield Rating, Electronic Warfare Rating and Point Defense Rating of the wing (where shields, EW systems and point-defense systems are installed.)

If an attack succeeds against a wing, the choice of which individual vehicle receives the damage depends on whether the wing's Driving/Piloting maneuver exceeded that of the attacker. If the wing's Driving/Piloting maneuver result was higher than that of the attacker, the leader of the wing chooses which vehicle in his wing suffers the damage. Otherwise the attacker decides which vehicle of the wing receives any damage inflicted.

> ⊞ **Example:** *At the Battle of Thousand Points of Light, Seraph split her squadron of twelve starfighters into three wings of four fighters each. When commanding her own wing, Seraph has a –15 penalty to her Piloting maneuvers. The wing receives a bonus of +15 (three additional craft) to all Gunnery OBs when making a wing attack. Individual starfighters have a Shield Rating of 15 and an EW Rating of 25. When treated as a wing, the collective Shield Rating is 30 (15 + 5 +5 +5) and the collective EW Rating is 40 (25 + 5 + 5 +5). The starfighters are too small to be fitted with point-defense systems, so they don't benefit in this area.*

⚙ SysOp's Choice: Variable Wing Bonuses

The vehicle wing rules give flat +5 bonuses regardless of the skills of the subordinate crews. To reflect more and less experienced crews, divide the Gunnery, Engineering, and Signaling skills of the subordinate crewmembers by 10, rounding down, total the contributions and apply the respective results to the collective Gunnery OB, Shield Rating, EW Rating and Point Defense Rating of the wing.

VEHICLE WEAPON SIZES

Each vehicle weapon is given a specific size, ranging from Tiny to Large. As with personal weaponry, the weapon size will modify critical results from a successful attack. This modifier is only applied after an attack has succeeded, however. It is never applied to the attack roll. It only influences the damage done – not the chances of success of an attack.

The following table determines the modifier for a weapon's size.

Table 2.4 Vehicle Weapon Sizes		
Attack Size	Critical Modifier	Damage Cap
Tiny	-20	80
Small	-10	90
Medium	0	100
Large	+10	110
Huge	+20	120

VEHICLE DAMAGE CAPS

A vehicle weapon's size also determines the maximum damage that it can normally inflict. These are called Damage Caps. If an attack's result is above the Damage Cap for the weapon's size, then the Adjusted Attack Roll is reduced to the maximum allowed for the weapon's size.

If when making a vehicle attack, an unmodified 99 or 100 is rolled on the dice, then that particular attack is allowed to ignore the Damage Caps.

❖ **Note:** There are no skills or combat actions that allow vehicle weapon attacks to ignore Damage Caps.

FUMBLE TABLE

Use the condensed Fumble Table to resolve all vehicle weapon attack fumbles.

Table 2.5 Condensed Fumble Table		
01 - 25	Vehicle Combat	He who hesitates is lost. You lose your action.
26 – 50	Vehicle Combat	A bad case of itchy trigger finger is diagnosed. You fire the weapon too soon and squander your attack.
51 – 75	Vehicle Combat	It didn't do that in the simulator. You've somehow managed to shut down your weapon. It'll take a minute to get it operational (or in ten rounds with an All-or-Nothing Medium Engineering maneuver.)
76 - 100	Vehicle Combat	If there is an allied vehicle or structure in the vicinity (SysOp's choice if more than one), you have just fired on it (resolve as an attack on the new target with the OB allocated to the original attack). If not, you've simply shut down your weapon and it'll take an engineer to get it operational again (an appropriate All-or-Nothing Hard (-20) Engineering maneuver.)

READING THE VEHICLE CRITICAL TABLES

Each entry on the critical tables has two parts: the description of the attack, and its effects.

The description is included purely for dramatic flavor, and SysOps should feel free to modify the result to reflect the actual situation. For example, if the enemy vehicle is a groundcar, and the description mentions damage to the "hull", the result should be interpreted as damage to the groundcar's chassis and bodywork. SysOps will have to apply some common sense in adjusting the descriptions, but should enjoy the process.

The second part of the attack description describes its effect. If a given vehicle does not have a specific subsystem, e.g. groundcars tend not to have shields or electronic warfare systems, the SysOp can substitute other subsystems from that vehicle location, e.g. spare power cell or onboard guidance system. Attacks can have any of the following results:

▢ **Hits:** This is damage that is subtracted from the target vehicle's total Structural Hits. This represents minor damage to the vehicle's hull and associated framing and internal structures.

▢ **Subsystem Damaged:** Vehicle attacks can degrade the effectiveness of a particular vehicle subsystem. The specific subsystem can still be used, but at a listed penalty to all maneuvers using that subsystem until it is repaired.

▢ **Subsystem Disabled:** This represents more serious damage to a vehicle subsystem, which renders it completely nonoperational. The subsystem cannot be used until it is repaired.

▢ **Subsystem Destroyed:** The affected subsystem has been utterly destroyed. The only solution is to replace it, either from spares or in the safety of a repair facility.

▢ **Explosive Decompression:** The consequence of one or more vacuum leaks in a space vehicle, this leads to the violent escape of the vehicle's atmosphere and potentially objects and individuals to vacuum. Full rules in HARP SF, Adventuring chapter, Explosive Decompression and Vacuum.

▢ **Vehicle Destroyed:** Instantaneous or eventual. If destruction is not immediate, anyone on or in the vehicle will normally have a few rounds (or minutes) to escape the conflagration.

All attack results are cumulative.

Most critical results give a suggested cost and base time to repair any damage other than Structural Points. (A few critical results are so severe that the vehicle cannot be saved and may not even yield any significant salvage.) The base time to repair or replace is in person-hours. The cost to repair/replace a vehicle subsystem is defined as a percentage of the entire vehicle's cost. Repairing one Structural Hit to a vehicle takes one hour (base time) and costs 0.1% of the vehicle's cost. For full rules on making repairs, see HARP SF, Adventuring chapter, Equipment Issues.

VEHICLE PIERCING TABLES

Vehicle Piercing Criticals

Roll	Result
(-19)-(-10)	You have the range. 1 Structural Hit.
(-9)-0	Accurate warning shot. 3 Structural Hits.
1-10	You do realize that the other guys are trying to kill you? 4 Structural Hits.
11-20	Interesting pattern of surface punctures on enemy hull. 5 Structural Hits.
21-30	Shots puncture hull plating but miss anything vital. 7 Structural Hits.
31-40	Damage to a weapons system imposes −20 penalty. Vehicle takes 8 Structural Hits. (Base time to repair: 1 hour. Cost: 1%)
41-50	Sensor array subsystem sustains general damage (-20 penalty). Vehicle takes 10 Structural Hits. (Base time to repair: 1 hour. Cost: 1%)
51-60	Electronic warfare subsystem is badly hit (-20 penalty). Vehicle takes 11 Structural Hits. (Base time to repair: 1 hour. Cost: 1%)
61-70	Shot perforates drive system, reducing vehicle maneuverability (-20 penalty) and inflicting 12 Structural Hits. (Base time to repair: 1 hour. Cost: 1%)
71-80	Fuel reserve / backup power unit compromised by your precision shooting. If appropriate, vehicle is venting fuel, otherwise backup power unit is disabled. 14 Structural Hits. (Base time to repair: 6 hours. Cost: 3%)
81-85	Fortuitous angle causes shots to pass through hull and enter crew module, coming to a stop inside crew consoles, inflicting a -20 penalty to all maneuvers and 16 Structural Hits. I wonder if they have an auxiliary bridge? (Base time to repair: 6 hours. Cost: 3%)
86-90	Enemy weapon system disabled. 18 Structural Hits. (Base time to repair: 6 hours. Cost: 3%)
91-95	Their communications system is disabled. How will you know if they surrender? Do you care? 20 Structural Hits. (Base time to repair: 6 hours. Cost: 3%)
96-100	Good shooting. Electronic warfare system is disabled. That should improve the odds in your favor. 22 Structural Hits. (Base time to repair: 6 hours. Cost: 3%)
101-105	Solid strike on enemy drive. Roll d100, 01-50 LaGrange mode is now disabled on FTL-capable craft, 51-00 conventional drive is disabled. If not FTL-capable, conventional drive disabled. 25 Structural Hits. (Base time to repair: 6 hours. Cost: 3%)
106-110	Crew module becomes hazardous place to be. SysOp should roll Medium Ballistic Shrapnel and/or Heat criticals against enemy crew. In space, there will be d10 vacuum leaks, leading to an explosive decompression event. 28 Structural Hits. (Base time to repair: 1 hour per leak. Cost: 1% per leak)
111-115	Power conduit subsystems and internal communications destroyed by internal hull damage and fires, rendering vehicle computer system unavailable and controls unusable. 30 Structural Hits. (Base time to repair: 12 hours. Cost: 5%)
116-119	Near-lethal strike disables main power system. Drive, shields, EW, computer system, life support, everything is down. Go for the kill. 33 Structural Hits. (Base time to repair: 12 hours. Cost: 5%)
120	Strike hits power system reactor. It will go critical in ten rounds, destroying the enemy vehicle utterly. 35 Structural Hits (Not repairable)

Range Modifiers

Weapon	AtmosRI	AtmosPB	SpaceRI	SpacePB	PB Bonus
Autocannon (Mark I)	400m	200m	60km	30km	+15
Autocannon (Mark II)	800m	400m	120km	760km	+20
Autocannon (Mark III)	1200m	600m	180km	90km	+25
Autocannon (Mark IV)	1600m	800m	240km	120km	+30
Autocannon (Mark V)	2000m	1000m	300km	150km	+35

Vehicle Piercing Weapons

Weapon	Attack Size	Fumble
Autocannon (Mark I)	Tiny	01-02
Autocannon (Mark II)	Small	01-02
Autocannon (Mark III)	Medium	01-02
Autocannon (Mark IV)	Large	01-02
Autocannon (Mark V)	Huge	01-02

Attack Size Modifiers

Attack Size	Critical Modifier
Tiny	-20
Small	-10
Medium	0
Large	+10
Huge	+20

VEHICLE ENERGY TABLES

Vehicle Energy Criticals

Roll	Result
(-19)-(-10)	Your beam touches the vehicle's hull lightly. 1 Structural Hit.
(-9)-0	Stop trying to clean the enemy's hull with your beam. 2 Structural Hits.
1-10	Beam burns neat holes through outer hull. 3 Structural Hits.
11-20	Your energy beam gives a section of enemy hull a molten look but you can't maintain your lock long enough to burn through. 4 Structural Hits.
21-30	Beam energies catch an enemy weapon system briefly, inflicting significant damage and a –20 penalty. 5 Structural Hits. (Base time to repair: 1 hour. Cost: 1%)
31-40	Fleeting strike causes damage to external portions of electronic warfare system (-20 penalty). Vehicle takes 6 Structural Hits. (Base time to repair: 1 hour. Cost: 1%)
41-50	Enemy main air lock (hatch / door) is fused shut. Vehicle takes 7 Structural Hits. (Base time to repair: 1 hour. Cost: 1%)
51-60	Beam burns through hull, starting a fire in crew compartment (Small Heat criticals to anyone within 5m). Vehicle takes 8 Structural Hits.
61-70	Energy beam causes instabilities in shield generators (-20 penalty) and 9 Structural Hits as it passes through the vehicle. (Base time to repair: 1 hour. Cost: 1%)
71-80	External maneuvering systems intercept beam. Vehicle now at –20 to all maneuvering. 10 Structural Hits. (Base time to repair: 1 hour. Cost: 1%)
81-85	Accurate shooting disables an enemy weapon system. 12 Structural Hits. (Base time to repair: 6 hours. Cost: 3%)
86-90	Enemy electronic warfare system is comprehensively cooked, disabling it. 14 Structural Hits. (Base time to repair: 6 hours. Cost: 3%)
91-95	Beam slices into drive system controls. Panels blow open and circuits melt. Roll d100, 01-50 LaGrange mode is now disabled on FTL-capable craft, 51-00 conventional drive is disabled. If not FTL-capable, conventional drive disabled.16 Structural Hits. (Base time to repair: 6 hours. Cost: 3%)
96-100	An enemy weapons system is completely destroyed. Good shooting. 18 Structural Hits. (Base time to repair: 6 hours. Cost: 3%)
101-105	Energies from your attack cause fires to start in the enemy bridge (Medium Heat criticals until extinguished) and –20 penalty to all vehicle-related maneuvers due to damaged consoles. 20 Structural Hits. (Base time to repair: 6 hours. Cost: 3%)
106-110	Enemy shield generator now resembles a heap of molten slag. Their shields are down until generator is replaced. 22 Structural Hits. (Base time to replace: 12 hours. Cost: 5%)
111-115	Beam broils enemy drive system. They are sitting ducks. 24 Structural Hits. (Base time to repair / replace: 12 hours. Cost: 5%)
116-119	Beam triggers power surges throughout vehicle, destroying consoles and computer systems. In one minute, power system will explode, destroying vehicle. Time to leave. 27 Structural Hits. (Not repairable)
120	The engines cannae take it, Cap'n. Five rounds to critical reactor failure and total vehicle destruction. 30 Hits. (Not repairable)

Vehicle Energy Weapons

Weapon	Attack Size	Fumble
Laser Cannon (Mark I)	Tiny	01-02
Laser Cannon (Mark II)	Small	01-02
Laser Cannon (Mark III)	Medium	01-02
Laser Cannon (Mark IV)	Large	01-02
Laser Cannon (Mark V)	Huge	01-02
Particle Beam Cannon (Mark I)	Tiny	01-03
Particle Beam Cannon (Mark II)	Small	01-03
Particle Beam Cannon (Mark III)	Medium	01-03
Particle Beam Cannon (Mark IV)	Large	01-03
Particle Beam Cannon (Mark V)	Huge	01-03
Plasma Cannon (Mark I)	Tiny	01-03
Plasma Cannon (Mark II)	Small	01-03
Plasma Cannon (Mark III)	Medium	01-03
Plasma Cannon (Mark IV)	Large	01-03
Plasma Cannon (Mark V)	Huge	01-03

Attack Size Modifiers

Attack Size	Critical Modifier
Tiny	-20
Small	-10
Medium	0
Large	+10
Huge	+20

Range Modifiers

Weapon	AtmosRI	AtmosPB	SpaceRI	SpacePB	PBBonus
Laser Cannon (Mark I)	200m	100m	100km	50km	+15
Laser Cannon (Mark II)	400m	200m	200km	100km	+15
Laser Cannon (Mark III)	600m	300m	300km	150km	+20
Laser Cannon (Mark IV)	800m	400m	400km	200km	+20
Laser Cannon (Mark V)	1000m	500m	500km	250km	+25
Particle Beam Cannon (Mark I)	100m	50m	60km	30km	+20
Particle Beam Cannon (Mark II)	200m	100m	120km	60km	+20
Particle Beam Cannon (Mark III)	300m	150m	180km	90km	+25
Particle Beam Cannon (Mark IV)	400m	200m	240km	120km	+25
Particle Beam Cannon (Mark V)	500m	250m	300km	150km	+30
Plasma Cannon (Mark I)	100m	50m	40km	20km	+20
Plasma Cannon (Mark II)	200m	100m	80km	40km	+25
Plasma Cannon (Mark III)	300m	150m	120km	60km	+30
Plasma Cannon (Mark IV)	400m	200m	160km	80km	+35
Plasma Cannon (Mark V)	500m	250m	200km	100km	+40

VEHICLE WARHEAD TABLES

Vehicle Warhead Criticals

Roll	Result
(-19)-(-10)	Their hull collects a few new dents and bumps. 1 Structural Hit.
(-9)-0	Enemy hull has seen better days as blast gouges out holes in outer surface. 3 Structural Hits.
1-10	Hull will need a total respray after this. 5 Structural Hits.
11-20	Blast catches a weapon system, causing misalignment and a variety of faults. −20 penalty and 7 Structural Hits. (Base time to repair: 1 hour. Cost: 1%)
21-30	Electronic warfare system assumes a new configuration, imposing a −20 penalty. Hull damage results in 8 Structural Hits. (Base time to repair: 1 hour. Cost: 1%)
31-40	Point defense system takes a serious beating (-20 penalty for impaired efficiency). 10 Structural Hits from hull damage. (Base time to repair: 1 hour. Cost: 1%)
41-50	Landing (or docking gear if appropriate) badly smashed up, incurring −20 penalty to all related maneuvers. 12 Structural Hits. (Base time to repair: 1 hour. Cost: 1%)
51-60	Blast rocks vehicle off-course. Any personnel not strapped in take a Tiny Impact critical, otherwise they are shaken, but not stirred. Vehicle endures 14 Structural Hits.
61-70	Maneuvering systems take brunt of the damage. −20 to all maneuvering. 16 Structural Hits. (Base time to repair: 1 hour. Cost: 1%)
71-80	Vehicle has crumpled look as hull areas suffer partial collapse. In space, there will be d10 vacuum leaks, leading to one or more explosive decompression events. 18 Structural Hits. (Base time to repair: 1 hour per leak. Cost: 1% per leak)
81-85	One enemy weapon system is destroyed. Overall damage to vehicle is 20 Structural Hits. (Base time to replace: 12 hours. Cost: 5%)
86-90	External portions of enemy communications and electronic warfare systems are destroyed. 22 Structural Hits. (Base time to replace: 12 hours. Cost: 5%)
91-95	Extensive hull and superstructure damage, including destruction of point defense system and (in space) d10 vacuum leaks. 24 Structural Hits. (Base time to replace: 12 hours. Cost: 5%)
96-100	Goodbye, shield generators. 26 Structural Hits. (Base time to replace: 12 hours. Cost: 5%)
101-105	Blast takes drive compartments, rupturing those hull areas and blowing the drive to bits. 28 Structural Hits. (Base time to replace: 24 hours. Cost: 10%)
106-110	Engine room is devastated (SysOp's choice of Medium Heat, Shrapnel, and/or Electrical criticals). Reactor will blow up in 1 minute and with it the vehicle. 30 Structural Hits. (Not repairable)
111-115	Hull compartments and bulkheads split apart, rupturing crew module. Large Shrapnel criticals and (in space) Vacuum criticals. Vehicle will break apart in ten rounds. 35 Structural Hits. (Not repairable.)
116-119	Total hull collapse. Crew have 5 rounds to escape before they are crushed to death. 40 Structural Hits. (Not repairable.)
120	Massive explosion destroys vehicle in one round. Everyone aboard is dead. 50 Structural Hits (Not repairable.)

Vehicle Warhead Weapons

Weapon	Attack Size	Fumble
Space Missile (Mark I)	Tiny	01-02
Space Missile (Mark II)	Small	01-02
Space Missile (Mark III)	Medium	01-02
Space Missile (Mark IV)	Large	01-02
Space Missile (Mark V)	Huge	01-02
Standard Missile (Mark I)	Tiny	01-02
Standard Missile (Mark II)	Small	01-02
Standard Missile (Mark III)	Medium	01-02
Standard Missile (Mark IV)	Large	01-02
Standard Missile (Mark V)	Huge	01-02
Surface-to-Air (Mark I)	Tiny	01-02
Surface-to-Air (Mark II)	Small	01-02
Surface-to-Air (Mark III)	Medium	01-02
Surface-to-Air (Mark IV)	Large	01-02
Surface-to-Air (Mark V)	Huge	01-02
Nuclear Warhead	Medium Capital-class	01-02

Attack Size Modifiers

Attack Size	Critical Modifier
Tiny	-20
Small	-10
Medium	0
Large	+10
Huge	+20

VEHICLE CRASH TABLES

Vehicle Crash Criticals

Roll	Result
(-19)-(-10)	It's just a dent. 1 Structural Hit.
(-9)-0	Hull acquires some new dents and scratches. Adds a bit of character to your vehicle. 2 Structural Hits.
1-10	Oblique glancing collision causes minor hull damage. 3 Structural Hits.
11-20	External portions of communications system are knocked out of shape. −10 penalty and 4 Structural Hits. (Base time to repair: 30 minutes. Cost: 1%)
21-30	External portions of electronic warfare system become misaligned during collision, imposing a −10 penalty. Hull damage results in 5 Structural Hits. (Base time to repair: 30 minutes. Cost: 1%)
31-40	Landing gear, docking gear, or wheels (as appropriate) warped out of shape, incurring −10 penalty to all related maneuvers. 6 Structural Hits. (Base time to repair: 30 minutes. Cost: 1%)
41-50	Collision knocks vehicle off-course. Any personnel not strapped in suffer a Tiny Impact critical. Vehicle takes 7 Structural Hits.
51-60	Maneuvering systems take main force of the impact. −20 to all maneuvering. 8 Structural Hits. (Base time to repair: 1 hour. Cost: 1%)
61-70	Partial collapse of several hull compartments (1-5 vacuum leaks in space and explosive decompression events). 10 Structural Hits. (Base time to repair: 1 hour per leak. Cost: 1% per leak)
71-80	Vehicle suffers significant hull damage and is knocked off-course by impact. Any personnel not strapped in suffer a Small Impact critical. Vehicle takes 12 Structural Hits.
81-85	External portions of electronic warfare system ripped off, disabling system. Vehicle takes 14 Structural Hits from hull damage. (Base time to repair: 6 hours. Cost: 3%)
86-90	Random weapons system smashed up in collision and is effectively destroyed. 16 Structural Hits. (Base time to replace: 12 hours. Cost: 5%)
91-95	Vehicle suffers substantial hull damage and is knocked off-course by impact. Any personnel not strapped in suffer a Medium Impact critical. Vehicle takes 18 Structural Hits.
96-100	Vehicle's maneuvering ability is seriously compromised (-40 penalty) 20 Structural Hits. (Base time to repair: 4 hours. Cost: 2%)
101-105	Vehicle hull compartments closest to impact point collapse, anyone inside suffers a Medium Crush or Vacuum Critical (in space) – and explosive decompression (in space). 22 Structural Hits. (Base time to repair: 6 hours. Cost: 3%)
106-110	Hull integrity is compromised in multiple sections (2d10 vacuum leaks and explosive decompression in space). Vehicle is knocked off-course by impact. Any personnel suffer a Medium Impact critical. Vehicle takes 25 Structural Hits. (Base time to repair: 1 hour per leak. Cost: 1% per leak)
111-115	Vehicle brought to sudden halt by force of impact. Compartments nearest to impact point are ruptured (explosive decompression in space). All personnel suffer a Medium Impact critical. 28 Structural Hits. (Base time to repair: 12 hours. Cost: 5%)
116-119	Vehicle stopped dead by force of impact. Compartments nearest to impact point are destroyed, while remaining structure is compromised. All personnel suffer Large Impact or Crush critical. Vehicle blows up in 1 minute. 30 Structural Hits. (Not repairable)
120	Impact shatters vehicle structure. All personnel suffer Large Impact criticals. In space, vehicle will lose atmosphere through multiple fractures and explosive decompression. Power system will blow in ten rounds. 35 Structural Hits (Not repairable)

Vihicle Crash Causes

Cause	Attack Size
Animal (Small or Medium)	Tiny
Animal (Large)	Small
Animal (Huge)	Medium
Asteroid/meteor (a large stone)	Tiny
Asteroid/meteor (person-sized)	Small
Asteroid/meteor (car-sized)	Medium
Asteroid/meteor (house sized)	Large
Asteroid/meteor (hill-sized or larger)	Huge
Boulder	Small
Building (wooden)	Small
Building (stone or brick)	Large
Fire Hydrant	Tiny
Highway Divider	Small
Lamp post	Small
Person	Tiny
Telephone pole	Tiny
Tree	Large
Meteor: Tiny	Tiny
Vehicle (of smaller size)	Small
Vehicle (of same size)	Medium
Vehicle (of larger size)	Large

Attack Size Modifiers

Attack Size	Critical Modifier
Tiny	-20
Small	-10
Medium	0
Large	+10
Huge	+20

PERSONAL, VEHICULAR AND CAPITAL-CLASS VEHICULAR COMBAT

Capital-class vehicles use the same rules as normal-sized vehicles for the resolution of combats against other capital-class vehicles. Compared to normal vehicles, capital-class vehicles can support much more powerful weapons, mount stronger shields, possess thicker hulls, etc., ensuring that they are harder to damage by weaponry (carried by smaller vehicles or even people) and capable of inflicting correspondingly greater damage on lesser vehicles and people. Similarly the vehicle-class weaponry of most normal vehicles is much more deadly to personnel than sentient-portable weaponry is to vehicles.

The category differences is resolved in HARP SF by altering size modifiers and damage caps according to the category size of the weapons and targets involved, as shown in Table 2.6 below.

Table 2.6 Size Modifiers and Damage Caps Matrix		Target is Person		Target is Vehicle		Target is Capital Ship	
Attack Scale	Attack Size	Size Modifier	Damage Cap	Size Modifier	Damage Cap	Size Modifier	Damage Cap
Personal	Tiny	-20	80	-80	20	-180	0
	Small	-10	90	-60	40	-160	0
	Medium	0	100	-50	50	-140	0
	Large	10	110	-40	60	-120	0
	Huge	20	120	-30	70	-100	0
Vehicle	Tiny	30	120	-20	80	-80	20
	Small	40	120	-10	90	-60	40
	Medium	50	120	0	100	-50	50
	Large	60	120	10	110	-40	60
	Huge	80	120	20	120	-30	70
Capital Ship	Tiny	100	120	30	120	-20	80
	Small	120	120	40	120	-10	90
	Medium	140	120	50	120	0	100
	Large	160	120	60	120	10	110
	Huge	180	120	80	120	20	120

The diagonal squares of the matrix are used for equal engagements between opponents using weaponry of the same category, and have the normal size modifiers and damage caps. The other non-diagonal squares are used for unequal encounters. When resolving a successful attack, consult the matrix, looking up the scale category of the attacker and the weapon size and cross-referencing this with the target's scale to read off the size modifier to be applied to the Total Attack Roll and the damage cap.

It is possible for the Adjusted Attack Roll to exceed 120 as a consequence of these size modifiers. Dead is dead and destroyed is still destroyed. SysOps may wish to modify the descriptive elements of the maxed-out critical results to better describe the "overkill" nature.

Likewise it is possible for the Adjusted Attack Roll to be less than –19 through the size modifiers. In such cases, the attack is completely ineffectual. It has bounced off superstrong shields and/or hullmetal.

❽ **Example:** *A Federation scoutship has the extreme misfortune to find itself in combat with a Silth battleship. One of the scoutship's gunners successfully makes an attack with a Small Laser Cannon. The Total Attack Roll is 128. Consulting the matrix for a Small Vehicle attack against a Capital-class vehicle gives a size modifier of –60 and a damage cap of 40. The Adjusted Attack Roll is 68 (128 –60), which is lowered by the damage cap to a mere 40. The battleship crew will notice the penalty to an EW system and the six Structural Hits, but are unlikely to be seriously concerned. The Silth gunners target the scoutship and one of their Medium Capital-class Laser Cannon makes a successful hit on the scoutship with a Total Attack Roll of 76. Consulting the matrix for Medium Capital-class weaponry against Vehicles yields a +50 size modifier and a damage cap of 120. The Adjusted Attack Roll is 126 (76 + 50), which maxes out at the damage cap of 120. Five rounds to a completely destroyed scoutship.*

PERSONAL WEAPONS VERSUS VEHICULAR AND CAPITAL-CLASS VEHICULAR WEAPONS

In a car chase, passengers may assist by firing out the windows with their firearms. They might choose to aim at the individuals in the opposing vehicles. Alternatively they might target the vehicles themselves, hoping to shoot out a tire. Primitive aliens might besiege a survey shuttle and bravely try to batter their way through its hull with clubs to avenge the desecration of sacred ruins. Trapped in the open, a squad of Federation marines might decide that a volley of laser bolts to take out an oncoming Silth aerofighter offers a better chance of survival than simply lying prone. The Silth gunners won't hesitate to use their autocannon against human troops in strafing runs.

In a combat that mixes personal combat and vehicular combat, every person involved must make an Initiative roll each round. This includes the gunners of the vehicles and their pilots, engineers, and communications officers. Pilots, engineers, and communications officers make their supporting maneuvers on their Initiative number. Bonuses to gunnery actions or to the vehicle's Defensive Bonus will thus only be available after the supporting crew has acted.

❽ Resolving a personal weapon attack against a vehicle or a capital-class vehicle

☐ Make an attack roll. This is an open-ended percentile roll.

☐ If the initial roll is within the fumble range for the weapon, the attack stops and you roll on the fumble table. If the initial roll is within the open-ended range (96-100), you roll again and add

the two rolls together. If the second or any other subsequent roll is between 96-100, you roll again and add it to the previous total.

☐ Add your character's OB (Offensive Bonus) to the final die result.

☐ Subtract the vehicle's DB (Defensive Bonus) from the adjusted die total. This is your Total Attack Roll. The vehicle DB is calculated as follows:

☐ If the vehicle is stationary: The DB is the total of the enemy vehicle's Armor Rating, its Shield Rating, and any bonus/penalty from the Engineering (Magnetogravitic) maneuver that their engineer declared against you.

☐ If the vehicle is in motion: The DB is the total of the enemy vehicle's Armor Rating, its Shield Rating, its Maneuverability Rating, any bonus/penalty from the Combat Driving/Piloting maneuver that their pilot declared for defensive piloting, and any bonus/penalty from the Engineering (Magnetogravitic) maneuver that their engineer declared against your attack.

☐ If the Total Attack Roll is 1 or higher, then you have hit your foe. Now that you have determined that you have hit, adjust your Total Attack Roll by adding or subtracting the appropriate size modifier (from Table 2.6) for the weapon that your character is using. This is your Adjusted Attack Roll.

☐ Look up your Adjusted Attack Roll on the proper Vehicle Critical Table, as determined by the conversion table below. This is the damage that you have done to the foe. All damage is applied immediately.

It is likely that personal weapon attacks will frequently be reduced to an Adjusted Attack Roll of less than –19, especially against capital-class targets (space stations, ground bases, large spacecraft, etc). In such cases, the attack is considered to have "bounced off" the vehicle's hull doing no damage at all.

The only Combat Action that will allow a personal weapon to increase its attack size and damage cap against vehicles is Aimed Burst. Ambush, Sniping and all other skills and combat actions, which can increase attack size or raise/ignore damaga caps are ineffective against vehicles (normal and capital-class), buildings and equivalent targets. Also an unmodified roll of 99-100 on the attack will not allow the damage cap to be ignored.

The Critical Tables associated with personal weapons are inappropriate for vehicle damage. So, the personal attack types are mapped to Vehicle Piercing and Vehicle Energy Critical Tables as follows:

Table 2.7 Critical Mappings from Personnel Attack Types to Vehicle Critical Types	
Vehicle Piercing	Crush, Puncture, Slash, Grapple, Martial Arts Strikes, Martial Arts Sweeps, Impact, External Poison, Ballistic Impact, Ballistic Puncture, Shrapnel
Vehicle Energy	Blaster, Heat, Cold, Electrical, Laser, Plasma

⁂ **Note:** Internal Poison and Neuro attacks are irrelevant to vehicles. Grapple and Martial Arts Sweeps/Unbalancing criticals attacks against vehicles only make sense when the attacker is a strong creature that is at least as large as the vehicle.

⊗ **Example:** *Olivier has the misfortune of finding himself facing an oncoming gravtank. A twisted ankle means that he has no hope of outrunning it and the gravtank knows where he is. He has already taken cover and mounted his machine gun on his tripod. Olivier wins the initiative and opens fire with an aimed burst. The dice roll is 47 plus 62 (skill), 40 (for burst fire and no recoil penalty), but –10 for range. Total is 139. The gravtank's DB is 40 (30 from Armor, 20 from Shields, -10 from Maneuverability). Total Attack Roll is 129 – 40 or 99. Consulting the matrix of Table 2.6 for Huge Personal attacks against Vehicles shows a –30 size modifier and a damage cap of 70. The Adjusted Attack Roll is 99 – 30 or 69. Looking up 69 on the Vehicle Piercing critical table reveals that the gravtank now has damage to its drive system (-20 penalty to Maneuverability) and has lost 12 structural hits.*

⊗ Resolving a vehicle or capital-class weapon attack against an individual

When you want your character to make a gunnery attack against an individual, first choose your target and then:

☐ Make an attack roll. This is an open-ended percentile roll.

☐ If the initial roll is within the fumble range for the weapon, the attack stops and you roll on the fumble table. If the initial roll is within the open-ended range (96-100), you roll again and add the two rolls together. If the second or any other subsequent roll is between 96-100, you roll again and add it to the previous total.

☐ Add your character's OB (Offensive Bonus) to the final die result.

▣ If the vehicle is stationary: The OB will be the total of your character's Gunnery skill with the weapon, the Weapons Rating of the weapon, and any Range Modifier for the distance between the vehicle and the target.

▣ If the vehicle is in motion: The OB will be the total of your character's Gunnery skill with the weapon, the Weapons Rating of the weapon, the Maneuverability Rating of the vehicle, any bonus/penalty from the Combat Driving/Piloting

maneuver that the pilot declared for offensive piloting, and any Range Modifier for the distance between the vehicle and the target.

- ▢ Subtract your foe's DB (Defensive Bonus) from the adjusted die total. This is your Total Attack Roll.

- ▢ If the Total Attack Roll is 1 or higher, then you have hit the individual. Now adjust your Total Attack Roll by adding or subtracting the appropriate size modifier (from Table 2.6) for the weapon system that your character is operating. This is your Adjusted Attack Roll.

- ▢ Look up your Adjusted Attack Roll on the proper Critical Table, as determined by the conversion table below. This is the damage that you have done to the foe. All damage is applied immediately.

∴ **Note:** This procedure is also used for missiles. Individuals cannot outrun missiles, cannot shoot them down with personal weapons (as the missiles traverse the range of such weapons too quickly), and electronic countermeasures are useless when a missile can simply be targeted at an area and explode on impact.

The vehicular weapon tables produce inappropriate damage results against individuals. So, the vehicle weapon types are mapped to personnel critical tables as follows:

Table 2.8 Vehicle to Personnel Critical Mapping	
Vehicle Critical	Personnel Critical
Vehicle Crash	Impact
Vehicle Energy (laser cannon)	Laser
Vehicle Energy (particle beam)	Blaster
Vehicle Energy (plasma cannon)	Plasma
Vehicle Piercing (autocannon)	Ballistic Puncture
Vehicle Warhead (conventional)	Shrapnel and Heat
Vehicle Warhead (nuclear)	Impact, Shrapnel, Plasma and Radiation

∴ **Note:** If an individual has the misfortune to be successfully targeted by a nuclear missile, the SysOp can simply rule that the character is vaporised. Checking the critical tables is only necessary if the character is outside the immediate blast radius.

∴ **Note:** Where multiple critical tables are indicated, the SysOp looks up the Adjusted Attack Roll on all the tables and applies all the damage results.

⊟ **Example:** *The gravtank driver slammed on the brakes after Olivier's attack. The gravtank gunner now opens fire with the autocannon. The OB is 53 (roll), plus 75 (Gunnery skill), plus 5 for Weapons Rating, plus 25 (for point blank bonus), giving a total*

of 158. Olivier's DB is 95 (75 from Heavy Body Armor and 20 from partial soft cover). Total Attack Roll is 63 (158-95), which is a hit. Consulting the matrix in Table 2.6 for a Mark II (Small attack size) autocannon against a person gives a size modifier of +40 and damage cap of 120. Vehicle Piercing translates into Ballistic Puncture. The Adjusted Attack Roll is 103 (63 +40). Olivier is at –30, stunned for 4 rounds, bleeding at 5 hits per round, has lost 39 hits and has a broken weapon arm The SysOp rules that his cover is also shredded.

FIGHTING INSIDE AND FROM VEHICLES

Vehicles may themselves become tactical environments where combats must be resolved. For instance, Starsoldiers might board a pirate spacecraft and engage the renegades in close quarters combat as they battle their way to the bridge and engine room. Whilst the combatants will definitely be aware that they are aboard a starship (and especially so if the hull is substantially ruptured!), artificial gravity and inertial compensators will insulate them from being affected by extreme velocity changes.

The impact of a vehicular environment on combat capabilities can be much more pronounced. These adverse effects can be the consequence of limited free space and general clutter – consider the difficulties of a brawl in the confines of a family groundcar or in the narrow aisles of a crowded airliner. They can also result from the environment itself - fighting aboard a sailing ship in heavy seas is as much about keeping one's footing as hitting the opponent, while anyone wingwalking on an airborne aircraft or clinging to the balloon of a dirigible will need secure tethers to avoid being literally blown away. The third set of issues emerge from the motion of the vehicle itself, particularly sudden and/or unexpected changes in velocity – anyone firing a pistol out the window of a moving gravcar is going to suffer penalties to their aim, and even more so if the driver decides to try a hairpin turn to escape pursuit.

The modifiers below only apply to combatants involved in melee or ranged combat within the confines of a vehicle, and to combatants using ranged weaponry (personal and vehicular) to fire at enemy personnel or vehicles, where the shooters/gunners are not insulated from their environment, securely strapped in, etc. Thus these rules would apply to an individual shooting with a handgun out a car window or sailors firing a culverin on a galleon, but not to a tank gunner using the fixed cannon of an assault vehicle, a fighter pilot strapped into his cockpit launching missiles, or the bridge crew of a starship equipped with a fully operational magneto-gravitic drive and systems.

The modifiers in the table below are cumulative - maneuver penalties apply to all Quickness and Agility-based maneuvers, while OB penalties apply to all attacks.

꙰ **Note:** all penalties for limited visibility (as described in HARP SF, Adventuring chapter) also apply.

Table 2.9 Vehicular Environmental Combat Modifiers		
Circumstance	Maneuver Modifier	OB Penalty
Interior Issues		
Restricted space	-20	-10
Cluttered space	-20	-10
Vehicle Velocity		
0-25% of maximum	+0	+0
26-50% of maximum	-10	-10
51-75% of maximum	-20	-20
76-100+% of maximum	-40	-30
Vehicle Acceleration (spacecraft only)		
0-25% of maximum	+0	+0
26-50% of maximum	-10	-10
51-75% of maximum	-20	-20
76-100+% of maximum	-40	-30
Stunts		
Quick Turn Maneuver	-20	-20
Double Back Maneuver	-40	-30
Stunt Maneuver	-60	-40
Combat Driving/Piloting		
Offensive / defensive driving/piloting	Apply negative result as penalty. Apply half of positive result as penalty	Apply negative result as penalty. Apply half of positive result as penalty
Ground Terrain		
Smooth roads	0	0
Uneven terrain (potholes in roads, speed bumps, open country)	-20	-20
Very uneven terrain (rocky ground, etc.)	-40	-40
Surface Ship Size and Type		
Unpowered Small (6m long or less)	-60	-20

Table 2.9 Vehicular Environmental Combat Modifiers		
Circumstance	Maneuver Modifier	OB Penalty
Unpowered Medium (7m to 16m long)	-40	-10
Unpowered Large (17m or longer)	-20	0
Powered Small (6m long or less)	-40	-10
Powered Medium (7m to 16m long)	-20	0
Powered Large (17m or longer)	+0	0
Surface Sea Condition (unpowered)		
Anchored Vessel	-5	-5
Calm Seas	-10	-10
Moderate Waves (2m or less)	-20	-20
Rough Waves (5m or less)	-30	-30
High Waves (10m or less)	-40	-40
Extreme Waves (greater than 10m)	-60	-60
Surface Sea Condition (powered)		
Anchored Vessel	+0	+0
Calm Seas	+0	+0
Moderate Waves (2m or less)	-5	-5
Rough Waves (5m or less)	-10	-10
High Waves (10m or less)	-20	-20
Extreme Waves (greater than 10m)	-30	-30
Air Conditions (flying)		
Turbulence	-20 to −60 (depending on severity)	-20 to −60 (depending on severity)
Wind Speed (if exposed to it)	-10 (per 10km per hour of windspeed)	-10 (per 10km per hour of windspeed)

⊟ **Example:** *Karl Jung and Alice Weaver in their stolen groundcar are still being pursued by one corporate cop on a gravitic bike. Alice has given up on trying to mentally control the cop so she decides to roll down the window and take a few pot shots at the cop's bike with her blaster. The groundcar counts as a restricted space (so −20 to maneuvers and −10 to OB), Jung is driving the car at half maximum speed (-10 to maneuvers, -10 to OB) but the road is smooth (no modifier to maneuvers or OB). The total penalties are −30 (-20 −10) to Agility and Quickness-based maneuvers and −20 (-10 −10) to OB.*

⊟ **Example:** *It just gets worse for Jung and Weaver. Megacorp security has scrambled an armed aircar which is even now tracking above their groundcar. As the aircar's machine gun is targeted on the groundcar, Karl is forced to try to drive defensively. A lucky Driving roll means a +10 bonus to the groundcar's DB. However that +10 bonus is an additional −5 penalty (halve positive bonus of 10 and apply as penalty) to Alice's OB and any Agility or Quickness-based maneuvers she attempts. Alice yells to Karl "next time I want Seraph as getaway driver!"*

CYBERWARE

With cyberware, individuals can become fusions of mind and metal, enhancing their bodies with implants to improve their senses, block pain, or link to other computers or replacing biological appendages with stronger, faster, better cybernetic analogues.

Cyberware is the collective term used for electromechanical and cybernetic devices that are imbedded into the bodies of humans and aliens. Minor cyberware items can enhance existing abilities (such as improving an individual's senses) or provide more direct means of interfacing with computers and machines. More significant augmentation involves the replacement of organs, hands, limbs and more with cyberware equivalents, transforming the person into a cyborg, a true melding of flesh and metal. The replacement parts are almost always stronger, faster, and more durable than the biological originals and frequently have additional capabilities.

Characters seeking augmentation will need to find a facility where the cyberware can be safely installed, have the credits to pay for the devices, and the free time to recover from any necessary surgery. Characters must also have a physiology and immune system that won't reject the cyberware and be willing to train in the proper use of the equipment.

In game terms, this means that cyberware has associated Talents and skills as well as financial and time costs.

CYBER COMPATIBILITY

The normal reaction of a biological system to the intrusion or attachment of a foreign object is to isolate it from the rest of the body. Cyberware is designed in such a way that this rejection process is not triggered. However, characters must possess a compatible physiology and immune system. This can either be an innate genetic quirk or it can be achieved through suitable drug therapies. In either case, it is represented in game terms by the Cyber Compatibility Talents.

❏ Cyber Compatibility (Lesser) is a requirement of any character who wishes to have basic cyberware augmentation. This includes cosmetic modifications, datajacks (for computer interfacing), and neuralware implants. It does not include cyberware devices that replace body parts.

❏ Cyber Compatibility (Greater) enables a character to have any form of cybernetic augmentation and replacement.

❏ Characters of any level (not just first level) may purchase the Cyber Compatibility Talents.

INSTALLING CYBERWARE

The amount of time required for cyberware augmentation or replacement depends on the complexity of the cyberware and whether the technology is Early, Mature or Advanced. Each cyberware addition must be performed separately.
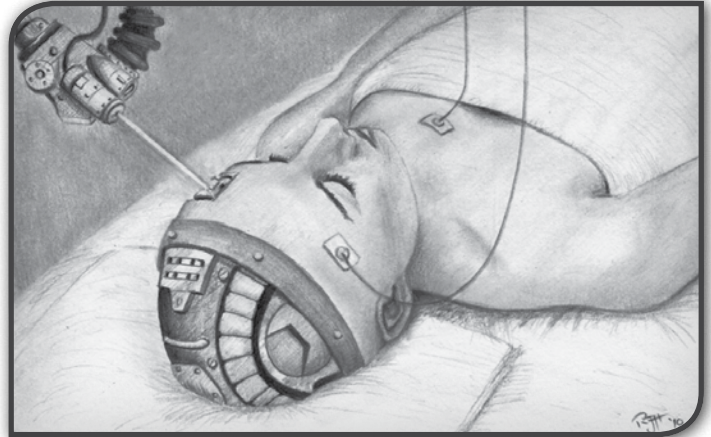
Cyberware augmentations (cosmetic modifications, datajacks and neuralware implants) are relatively simple procedures and can be performed by any trained person. The time costs include carrying out the procedure, recovering from the augmentation, and (for datajacks and neuralware) a period of "integration" as the brain learns how to access the cyberware. For datajacks and neuralware implants, the procedural and convalescence cost are 1,000 credits regardless of technology level; for other augmentations and for neuralware options, these costs are 500 credits.

❏ An Early cyberware augmentation requires 2 days.

❏ A Mature cyberware augmentation requires 1 day.

❏ An Advanced cyberware augmentation requires 6 hours.

Cyberware replacements are much more complex procedures and normally require significant surgery (to remove the original biological body part and install the cybernetic components). These are normally performed in approved medical facilities such as specialist hospitals. Certain cyberware options are deemed to be Restricted. Criminals and anyone else who wants to avoid having their augmentations and replacements registered with the authorities will need to find a back-street operator who will charge extra for confidentiality and probably a riskier service. Cyberware replacement procedures require more time for pre-operation preparation, post-operative recovery, and integration of the new unit, and these preparation and convalescence times have a minimum daily cost.

❏ An Early cyberware replacement requires 4 weeks and costs 1,000 credits per day.

❏ A Mature cyberware replacement requires 2 weeks and costs 2,000 credits per day.

❏ An Advanced cyberware replacement requires 1 week and costs 5,000 credits per day.

The minimum financial cost for the actual cyberware augmentations and replacements (as Mature technology) are given in Table 3.6. For Early cyberware, the costs should be doubled. For Advanced cyberware, the cost should be halved.

For characters taking cyberware options at first level (i.e. at character creation), the SysOp should waive the normal financial and time costs. However Development Points must still be expended on Cyber Compatibility Talents (see above) and on the Cyber Control skill(s) (see below).

Player-characters with engineering and medical skills and the right gear may want to perform their own cybernetic augmentations and replacements on other people. Installing a cyberware augmentation requires a Light (+20) Medical Practice maneuver and a Medium (+0) Engineering (Cybernetics) maneuver. Installing a cyberware replacement (except cybertorsos and cyberheads) requires a Very Hard (-40) Medical Practice maneuver and a Very Hard (-40) Engineering (Cybernetics) maneuver. Cybertorso and cyberhead installations are much more complex – both require Sheer Folly (-80) Medical Practice maneuver and Sheer Folly (-80) Engineering (Cybernetics) maneuvers. A player-character who wishes to install an augmentation or perform a replacement on himself is insanely reckless – SysOps should raise difficulty degrees by two steps for augmentations and at least three steps for replacements, and in many cases should simply rule that the procedure is impossible to perform on oneself.

Sensible individuals will ensure that they have access to a life support unit, if not a regeneration tank, just in case the surgery goes horribly wrong.

USING CYBERWARE

HARP SF assumes that the average character has certain basic skills such as walking, talking, and the like. Characters do not have to expend Development Points to acquire these foundational skills. Cyberware is, however, different. A character who has had his lower limbs replaced with a pair of cyberlegs must train in the proper use of those cyberlegs. This is partly because the cyberlegs are not the same as the organic legs that the character was born with, partly because cyberware is frequently designed to give its possessor a much greater conscious control over its operation, and partly because cyberware creators excel in adding capabilities that the organic originals never had.

In game terms, this training is represented by the Cyber Control skills. A character must develop skill ranks in the relevant Cyber Control skill for each implant or replacement cyberware device. Learning how to use a cybereye is not the same as learning how to operate a cyberhand. Cyberware devices are divided up into the following categories, each of which is represented by a distinct Cyber Control skill:

Arms: this category includes cyberhands and cyberfingers as well as cyberarms.

Implants: this category includes neuralware implants, datajacks, and all cosmetic modifications that permit conscious control.

Legs: this category includes cyberfeet as well as cyberlegs.

Miscellaneous: this class covers the very rare cyberhead units, voice units and torso replacements.

Senses: this group includes cybereyes, cyberears, cybertouch, cybernoses, etc.

The number of skill ranks required for effective use of a cyber device depends on the complexity of that device. A cybereye that gives its possessor access to thermal imaging, low-light imaging, and telescopic focusing is much harder to use than a cybereye that simply duplicates the original vision of its possessor. The number of skill ranks required for cyber devices and their options are given in Table 3.6 and a character must have at least as many skill ranks in the appropriate Cyber Control skill as required by each installed item and option of the relevant category.

❽ **Example:** *Consulting Table 3.6, to use a cybereye in normal mode requires 2 skill ranks in Cyber Control (Senses). To access and more importantly interpret thermal imaging demands 2 additional skill ranks. Likewise low-light imaging requires 1 extra skill rank as does telescopic focusing. Thus to fully master a cybereye with normal vision, thermal imaging, low-light imaging, and telescopic focusing requires 6 skill ranks (2 + 2 + 1 + 1) in Cyber Control (Senses).*

Upgraded cyberware units do not require characters to relearn what they already know, but they must train in any new features.

❽ **Example:** *Kathryn's character has upgraded her cybereyes from a model with normal vision, thermal imaging, low-light imaging, and telescopic focusing to a brand-new unit that also has underwater vision and glare filters. Her six skill ranks in Cyber Control (Senses) will allow her to use the new eyes' normal vision, thermal imaging, low-light imaging, and telescopic focusing capabilities, but to use the underwater vision and glare filters will necessitate purchasing two more skill ranks (1 for each option as listed in Table 3.6)*

❽ **Example:** *Kathryn's original neuralware implant and its Painblocker option were irrevocably damaged by an electromagnetic pulse. She has replaced it with a new implant with the Stunblocker option. She already has five skill ranks in Cyber Control (Implants), 3 skill ranks to operate the implant and 2 skill ranks for the Painblocker option. She will need to learn two further skill ranks to operate the Stunblocker option.*

Additional cyberware units require additional training, e.g. a character who has developed 6 skill ranks in Cyber Control (Senses) to master a cybereye will still need to develop 2 further skill ranks to achieve basic control of a cyberear.

A character fitted with more than one cyberfinger, cyberhand, cyberarm, cyberfoot cyberleg etc. must train to use each unit separately, e.g. one cyberarm requires 3 skill ranks, two cyberarms requires 6 skill ranks, etc. A character fitted with a cyberarm and a cyberhand requires 6 skill ranks in Cyber Control (Arms) – 3 skill ranks to use the cyberarm and 3 skill ranks to use the cyberhand. Note that cyberarms actually end just above the wrist (or equivalent) and cyberlegs terminate above the ankle, so full limb replacements always require two cyber components. Cyberhands and cyberfeet do have included fingers and toes (or nonhuman analogues), though cyberfingers can be fitted separately to biological "hands".

Once a character has invested the necessary Development Points to gain the requisite skill ranks, no maneuver roll is normally required to use the features of the cyberware, e.g. a character can switch among cybereye vision modes at will, walk normally using cyberlegs etc. Stunned characters must make Cyber Control maneuver rolls to operate their cyberware. Naturally characters must still make Perception maneuvers, Acrobatics maneuvers, etc., to accomplish tasks using the cyberware!

CYBERWARE POWER

There are two common techniques for powering cyberware, namely bioelectrical wiring and miniature power cells.

Bioelectrical wiring draws power from the possessor, so instead of a character's sustenance being converted into energy to power organic muscles, some of that energy is diverted into powering cybernetic components. Bioelectrical wiring is most useful for internal cyberware devices such as implants and replacement organs where replacing a battery would entail dangerous surgery. It is also used as a backup source for larger units such as cyberhands and cyberlimbs so that they can still be used even when a power cell is fully drained. Cyborg characters who are too stingy to make this investment run the risk of finding that their cyberlimbs won't move one day because of a flat power cell. That's embarrassing on a high-tech world but probably fatal on a low-tech planet. Bioelectrical wiring is limited by how much energy a human or alien body can generate. Thus it is insufficient on its own to power built-in weapons or perform prolonged feats of extraordinary strength, speed, or endurance.

Miniature power cells, typically utility power minicells and weapon power minicells, have the energy capacity to keep cyberware running for weeks and the ability to release it fast enough to drive built-in weapons systems. Just as bioelectrical wiring is used as a backup for power cells, so utility minicells provide backup energy for implants and cyberware organs. In the event that the host cannot power the unit, the device can be run off the minicell just like a battery. Once circumstances return to normal, the minicell can be recharged gradually by the body. Minicells hold 20 energy units (Early: 10, Advanced 40) and a cyberware unit will typically consume one unit per day or per shot. Utility minicells cost 10 credits, while weapon minicells cost 15 credits; double these prices for Early versions and halve them for Advanced versions.

Exchanging a minicell is the only form of maintenance that most external cyberware units should need. Changing a minicell is a Routine Machine Operation or Routine Engineering (Cybernetics) maneuver and takes 5 rounds to complete. Minicells can also be charged inductively, but this requires the user to be in contact with an inductive charging power point for a prolonged period. To fully recharge a utility power minicell takes 4 hours (Early), 2 hours (Mature) and 1 hour (Advanced). To fully recharge a weapons power minicell takes 2 hours (Early) and 1 hour (Mature and Advanced).

CYBERWARE DAMAGE

Heroes with lots of cool cyberware are just the sort of people who are likely to get their cyberware damaged pursuing dangerous activities like adventuring, combat and exploration. In almost all cases, the risk of damage is resolved as a malfunction roll (d100 roll, not open-ended). If the result falls within the malfunction range, a further roll on the Malfunction Table must be made (as described in HARP SF, Chapter 9; the table can also be found in Chapter 4 of this volume). The malfunction range is 01-05 normally and 01-25 if the unit has had a jury-rig repair.

✸ Cyberware Damage By Power Cell Mishandling

If a maneuver to exchange a power cell is failed, then a malfunction roll must be made (in case sloppy handling has led to damage). If the result of the malfunction roll is within the malfunction range, then a malfunction has occurred and a d100-20 roll on the Malfunction Table must be made.

✸ Cyberware Damage from Combat

For combat damage, the resolution mechanism depends on whether cyberware fully occupies the body region (e.g, a full cyberarm) or if the cyberware shares the location with organic body parts (a cyberfinger or cyberhand in an arm location).

For cyberware that fully occupies a body region, then instead of applying the original critical result, look up the Adjusted Attack Roll result on the Malfunction Table instead.

> **✸ Example:** *An Adjusted Attack Roll of 76 on the Laser Critical Table is a bolt in the lower arm. If the unlucky target had a cyberarm, then instead of applying bleeding at 2 hits per round, 4 rounds of stunning, a –20 penalty, and 26 hits, the Adjusted Attack Roll of 76 would be looked up on the Malfunction Table instead, yielding a –25 penalty and 40% performance effectiveness for the cyberarm.*

For cyberware that shares a body region with organic body parts, the SysOp should make an additional roll on the Malfunction Table. Where the malfunction result replaces the normal critical, characters may get off more lightly in some cases. Where the malfunction roll is in addition to the normal critical, the character may suffer the worst of both worlds – an energy blast might reduce a biological arm to uselessness and the accompanying malfunction render a cyberhand say offline and necessitate both healing and repair before the character is fully effective.

The attack size of the weapon maps to malfunction severity as follows:

Table 3.1 Attack Sizes and Malfunction Severity	
Tiny	d100-20 roll on the Malfunction Table
Small	d100-10 roll on the Malfunction Table
Medium	d100 roll on the Malfunction Table
Large	d100+10 roll on the Malfunction Table
Huge	d100+20 roll on the Malfunction Table.

If the attack is made by a vehicular weapon system or a capital-class vehicle weapon system, apply the appropriate size modifier as given in Table 2.6 in the Vehicle Combat chapter, Personal, Vehicular and Capital-Class Vehicular Combat section. Note: This may cause the

result to exceed 120, in which case the malfunction is capped at 120. Destroyed is still destroyed.

> **Example:** *A laser pistol deals out Small Laser criticals. This equates to d100-10 rolls on the Malfunction Table. A Mark IV autocannon delivers Large Vehicle Piercing criticals. These equate to d100 + 10 + 40 rolls on the Malfunction Table.*

Weapons and fumbled psionic activations that deliver Neuro criticals will also affect active cyberware - characters may make an Electronics RR against such damage with the target given by the critical size: Tiny 75, Small 100, Medium 125, Large 150, and Huge 175. If the RR is failed, roll directly on the Malfunction Table as described above.
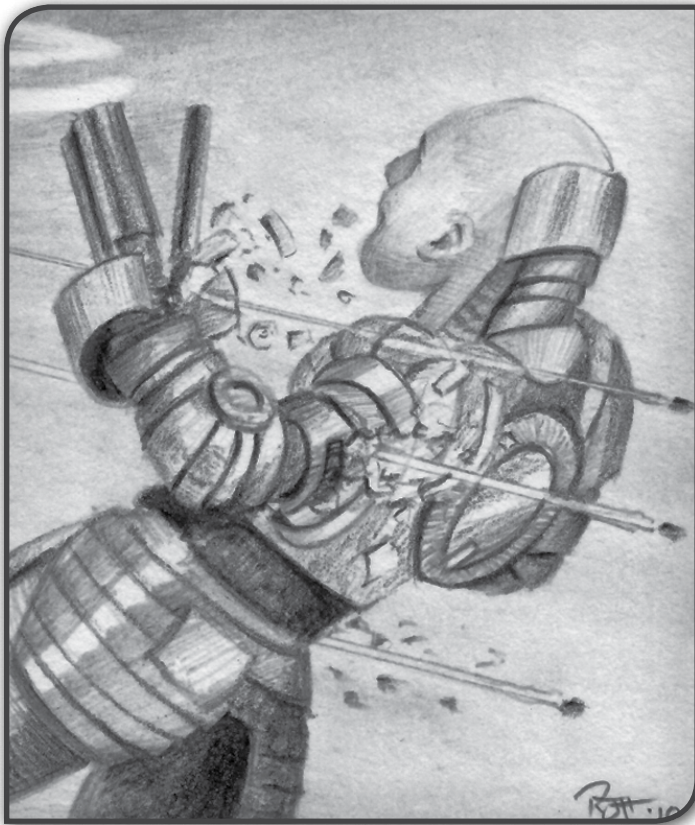
Cyberware Damage By Direct Physical Damage

Direct physical damage includes exposure to corrosive gases or acids, extremes of heat and cold, sudden impacts, electrical surges, etc., but excludes electromagnetic pulses, radiation, combat, or indirect damage from a hostile environment. As with combat damage, the resolution mechanism depends on whether the damage is localized to a body region fully occupied by cyberware or not.

There are three cases to consider:

☐ The damage is automatically localized to a cyberware-only region, i.e. a character plunges his cyberam into a vat of acid. Make a malfunction roll, and if required, make a further roll on the Malfunction Table with the severity corresponding to the analogous biological critical size (see Table 3.2).

☐ The character has suffered a critical result where the description relates the damage to a body location fully occupied by cyberware. Instead of applying the critical result, look up the same number directly on the Malfunction Table and apply that result.

☐ The character has suffered a critical result where the description relates the damage to one or more body locations that are part cyberware and part organic. In this case, in addition to the critical result, the SysOp should also make a further roll on the Malfunction Table with the severity corresponding to the analogous biological critical size (see Table 3.2), and apply that malfunction as well to the character.

Direct physical damage will normally be expressed in terms of a critical of a certain attack size:

Table 3.2 Physical Damage and Malfunction Severity	
Tiny	d100-20 roll on the Malfunction Table
Small	d100-10 roll on the Malfunction Table
Medium	d100 roll on the Malfunction Table
Large	d100+10 roll on the Malfunction Table
Huge	d100+20 roll on the Malfunction Table.
Other damage should require a d100 roll with no modifiers.	

> **Example:** *An electrical surge rated as a Large Electrical attack becomes a d100+10 roll on the Malfunction Table.*

Cyberware Damage by Indirect Physical Damage

Indirect physical damage results from a cyberware unit being exposed to a hostile environment, such as extremely high or extremely low ambient temperatures or extremely high pressure.

For every full ten minutes that a cyberware unit is exposed to ambient temperatures below –20 degrees Celsius or above 100 degrees Celsius, a malfunction roll must be made. If a malfunction occurs, the severity of the malfunction depends on how far the environment is outside the normal operating temperature:

Table 3.3 Temperature Differentials and Malfunction Rolls		
d100–20	-30 to –21 deg. Celsius	101 to 120 deg. Celsius
d100–10	-50 to –31 deg. Celsius	121 to 150 deg. Celsius
d100	-100 to –51 deg. Celsius	151 to 200 deg. Celsius
d100+10	-200 to –101 deg. Celsius	201 to 300 deg. Celsius
d100+20	-201 deg Celsius and below	301 deg. Celsius and above

For every ten minutes that a cyberware unit is exposed to elevated pressure (i.e. on a world with a dense atmosphere, deep underwater, etc.), a malfunction roll must be made as the device may suffer damage from the crushing effect of the air, water or other medium. Pressures up to 5 atmospheres (equivalent to underwater depths of up to 40m) are within the normal safe operating range of cyberware devices. If a malfunction occurs, its severity will vary in proportion to the excess pressure:

Table 3.4 Elevated Pressure and Malfunction Rolls	
d100−20	Up to 5 Earth atmospheres (above normal operating maximum)
d100−10	Up to 10 Earth atmospheres (above normal operating maximum)
d100	Up to 25 Earth atmospheres (above normal operating maximum)
d100+10	Up to 50 Earth atmospheres (above normal operating maximum)
d100+20	More than 50 Earth atmospheres (above normal operating maximum)

⊗ Cyberware Damage from Electromagnetic Pulses and Radiation

Electromagnetic pulses and radiation can cause significant damage ranging from transient glitches to complete breakdown to all forms of cyberware. Cyborgs who happen to be the victims of targeted or area electromagnetic pulses must make Electronic Cascading Resistance Rolls for each cyberware unit on their body. Each unit that fails its Electronic CRR will suffer a malfunction.

For each cyberware unit, the player makes an Electronic CRR, adding the character's skill in Resistance: Electronic and any bonus the unit has due to an EMP Shielding option, and compares the results to the Electronic CRR Results Table below:

Table 3.5 Electromagnetic Pulses and Radiation Damage and associated Malfunction Severity	
CRR(Target)	No effect
CRR(Target - 25)	1d100−20 on the Malfunction Table
CRR(Target - 50)	1d100−10 on the Malfunction Table
CRR(Target - 75)	1d100 on the Malfunction Table
CRR(Target - 100)	1d100+10 on the Malfunction Table
Failure	1d100+20 on the Malfunction Table

❽ **Example:** *A Mark III pulse grenade has a target number of 125. Kathryn has a neuralware implant and a pair of cybereyes. Her Electronic Resistance skill is 63. Her cybereyes have an EMP Shielding bonus of +10, but her neuralware implant is not shielded. Kathryn's player must make three CRRs, one for the implant and one for each cybereye. Her player rolls 19 for the implant, plus 63 for skill, giving a result of 82, which is more than CRR(125 − 50) but less than CRR (125 −25), so a d100-10 roll on the malfunction table must be made. For the cybereyes, she rolls 34 and 71. 34 + 63 (skill) + 10 (EMP Shielding) = 107, so a d100-20 malfunction occurs on the left eye. 71 + 63 (skill) + 10 (EMP Shielding) = 144, so no effect on the right eye.*

If a cyborg is exposed to radiation, the cyborg must make a Stamina CRR as normal against the harmful effects of radiation on the biological portions of his body (see HARP SF, Chapter 9, Radiation). In addition, each unit of cyberware must make an Electronic CRR with the target number given by the event or source producing the radiation and the results looked up on the Electronic CRR Results Table given above. Really unlucky characters might end up with their (external) cyberware becoming radioactive and thus require it to be replaced.

The best defense against electromagnetic pulses and radiation is to be safely within a functioning magneto-gravitic shield.

CYBERWARE REPAIR

Repairing cyberware uses the normal equipment repair rules. The requisite specialty Engineering skill is Engineering (Cybernetics). Implants and internal devices are repaired using arthoscopy and/or nanotech devices. As cyberware is directly connected to the body, some damage may also require medical attention to treat biological injuries. SysOps should increase the difficulty degree for characters trying to repair themselves by one to three steps (a -20 to −60 additional penalty) applying common sense and in some cases simply rule the task to be impossible.

If a cyberware unit is destroyed, rather than damaged or disabled, then it must be replaced. This will normally require a procedure akin to the original installation (see above).

UPGRADING AND REMOVING CYBERWARE

Occasionally a character may decide that installed cyberware must be removed and his body returned to its original state. More usually, the cyborg wants to replace outdated gadgetry with the latest models.

The time taken and financial cost to uninstall the cyberware are identical to the time and expense of the original installation. For player-characters who want to do the job themselves on someone else, uninstalling a cyberware augmentation requires a Medium (+0) Engineering (Cybernetics) maneuver and a Light (+20) Medical Practice maneuver. Uninstalling a cyberware replacement (except for cybertorsos and cyberheads) requires a Very Hard (-40) Engineering (Cybernetics) maneuver and a Very Hard (-40) Medical Practice maneuver. Uninstalling cybertorsos and cyberheads requires a Sheer Folly (-80) Engineering (Cybernetics) maneuver and a Sheer Folly (-80) Medical Practice maneuver. Once the old gear has been removed, new cyberware can be installed as per the normal rules (see Installing Cyberware).

⁚ **Note:** A player-character who wishes to uninstall cyberware from himself is unimaginably reckless – SysOps should raise difficulty degrees by two steps for augmentations and at least three steps for replacements, and in many cases should simply rule that the procedure is impossible to perform on oneself.

Where a character has had a cyberware replacement device removed and wishes to be restored to his natural biological form, the lost body part(s) must be regrown and this will require 1d10 days spent in a regeneration tank. Characters do not need to expend Development Points to relearn how to use their biological body. Development Points spent on Cyber Compatibility Talents and Cyber Control skills cannot be reclaimed.

⊗ Tintamar Knowledge Base: Cyberware

Basic cyberware augmentation such as data jacks and neuralware implants is relatively common, even ubiquitous in most Cosmopolitan and Belter societies. Cosmetic modification

is currently fashionable among young humans. In some archconservative religious human cultures, all cyberware is prohibited to believers.

Cyberware replacement is more rare, partly due to the efficacy of regeneration techniques. In Federation space, cyborgs are required to declare all replacements; those with Restricted options can expect additional scrutiny and may even be required to disable the cyberware on certain worlds.

Apart from humans, Cerans are the most prolific users of cyberware. Gorsivans and Krakuren eschew it completely. Some Silth military units do use both augmentation and replacement, but it is not readily available to ordinary Silth citizens.

CYBERWARE DEVICES

Table 3.6 Cyberware Devices		
Cyberware Type	# of Skill Ranks	Base Cost
Implants / Augmentation		
Data Jack	2	500
Fiber Hair	1	200
Nanotattoo	1	200
Neuralware Implant	3	2000
- Audio Enhancer	1 per +5	1000 per +5
- Bloodstopper	4	2000
- Cooordination Booster	1 per +1	3000 per +1
- Cryptocomms	2	200
- EMP Biofeedback	1	1000
- Focus Booster	1 per +1	3000 per +1
- Intuition Booster	1 per +1	3000 per +1
- Knowledge Package	1 per Package	5000
- Logic Booster	1 per +1	3000 per +1
- Memory Recording	2	500
- Mind Control	0	1000
- Olfactory Enhancer	1 per +5	1000 per +5
- Organ Control	2 per organ	500
- Painblocker	2	1000
- Sense Enhancer	1 per +5 (per Sense)	2000 per +5
- Sense Receiver	2 per Sense	5000
- Sense Transmitter	1 per Sense	2500
- Skill Expertise	2 per skill	2500 per additional skill rank
- Social Booster	1 per +1	3000 per +1
- Speed Booster	1 per +1	3000 per +1
- Stamina Booster	1 per +1	3000 per +1
- Strength Booster	1 per +1	3000 per +1
- Stunblocker	2	1000
- Tactile Enhancer	1 per +5	1000 per +5
- Taste Enhancer	1 per +5	1000 per +5
- Vision Enhancer	1 per +5	1000 per +5
Subdermal Pouch	0	200

Table 3.6 Cyberware Devices		
Cyberware Type	# of Skill Ranks	Base Cost
Cyberarm Replacements		
Cyberarm	3	5000
- Agile Arm	1 per +1	3000 per +1
- Built-in Weapon	2	5x weapon cost
- Concealed Cavity	1	1000
- Extra Arm	6	7500
- Fast Arm	1 per +1	3000 per +1
- Strong Arm	1 per +1	3000 per +1
Cyberfinger	1	500
- Scanner Option	3	10x scanner cost
- Tool Option	2	500
- Built-in Weapon	1	5x weapon cost
Cyberhand	3	2500
- Built-in Weapon	2	5x weapon cost
- Extra Hand	6	4000
- Locking Grip	1	1000
- Scanner Hand	3	5x scanner cost
- Tool Hand	6	2500
Miscellaneous Replacements		
Artificial Organ	1 per organ	2000
Cyberhead	3	10000
Cybertorso	3	30000
Cybervoice	2	2000
- Amplifier	1 per +5	1000 per +5 bonus
- Emulator	2	1000
- Modulator	2	500
Disease Protector	1 per +5	2000 per +5 bonus
Electrical Protector	1 per +5	2000 per +5 bonus
Medication Organ	1 per organ	2000 + (drug dose cost x10)
Poison Protector	1 per +5	2000 per +5 bonus
Sonic Protector	1 per +5	2000 per +5 bonus
Specific Device	2	x10 device cost
Cyberleg Replacements		
Cyberfoot	3	2500
- Extra Foot	6	2500
- Hand Option	6	2500
Cyberleg	3	5000
- Agile Leg	1 per +1	3000 per +1
- Concealed Cavity	1	1000
- Extra Leg	6	7500
- Fast Leg	1 per +1	3000 per +1
- Strong Leg	1 per +1	3000 per +1

Table 3.6 Cyberware Devices		
Cyberware Type	# of Skill Ranks	Base Cost
Cybersense Replacements		
Cyberear	2	1000
- Amplifier	1 per +5	1000 per +5 bonus
- Antisonic	2	100
- Antisound	2	300
- Directional Pickup	1	200
- Infrasound	2	500
- Ultrasound	2	500
Cybereye	2	2000
- Antidazzler	2	200
- Antiglare	1	200
- Extra Eye	4	5000
- Low Light	1	500
- Microvision	2	1000
- Motion Sensing	1	1000
- Peripheral Sight	2	500
- Spectral Range	2	1000
- Telescopic Focusing	1	500
- Thermal Imaging	2	1000
- Ultraviolet	2	1000
- Underwater	2	1000
Cybernose	2	1000
- Amplifier	1 per +5	1000 per +5 bonus
- Antiscent	2	500
- Filtration	2	2500
Cybersense	2	2000
- Amplifier	1 per +5	2000 per +5 bonus
- Filter	2	1000
Cybersonar	2	1000
- Amplifier	1 per +5	1000 per +5 bonus
- Filter	2	500
Cybertongue	2	1000
- Amplifier	1 per +5	1000 per +5 bonus
- Filter	2	500
Cybertouch	2	1000
- Amplifier	1 per +5	1000 per +5 bonus
- Filter	2	500

⯈ADDITIONAL OPTIONS

Cyberware devices can be armored against physical attacks and shielded against electromagnetic pulses. Most cyberware can also be made to look less obvious through the use of natural-looking synthetic skin.

Armored Option: Cyberarms, Cyberfeet, Cyberhands, Cyberheads, Cyberlegs, and Cybertorsos can be armored to provide their possessor with additional DB. The cost varies according to the level of protection and is expressed as a multiplier of the base cost of the device (see below). It cannot be combined with the Biological Option or the Armored Biological Option. Characters can wear normal armor and protective suits over armored cyberware.

Table 3.7 Armored and Armored Biological Cyberware										
	Early		Mature				Advanced			
	DB	Cost	DB	Cost	DB	Cost	DB	Cost	DB	Cost
Armored Option										
Cyberarm	+1	x5	+2	x10	+3	x15	+4	x20	+5	x25
Cyberfoot	+1	x5	+2	x10	+3	x15	+4	x20	+5	x25
Cyberhand	+1	x5	+2	x10	+3	x15	+4	x20	+5	x25
Cyberhead	+1	x5	+2	x10	+3	x15	+4	x20	+5	x25
Cyberleg	+1	x5	+2	x10	+3	x15	+4	x20	+5	x25
Cybertorso	+3	x5	+6	x10	+9	x15	+12	x20	+15	x25
Armored Biological Option										
Cyberarm	+1	x10	+2	x20	+3	x30	+4	x40	+5	x50
Cyberfoot	+1	x10	+2	x20	+3	x30	+4	x40	+5	x50
Cyberhand	+1	x10	+2	x20	+3	x30	+4	x40	+5	x50
Cyberhead	+1	x10	+2	x20	+3	x30	+4	x40	+5	x50
Cyberleg	+1	x10	+2	x20	+3	x30	+4	x40	+5	x50
Cybertorso	+3	x10	+6	x20	+9	x30	+12	x40	+15	x50

⯈ **Example:** *A normal Cyberhand with the Locking Grip option costs 3500 credits (2500 credits for the hand plus 1000 credits for the option). A Cyberhand with the Armored Option (+3 DB) and Locking Grip costs 38,500 credits (2500 x15 plus 1000).*

Armored Biological Option: This enhancement uses synthetic skin and equivalent materials to give cybernetics the outward look and feel of their biological equivalents, while reinforcing it with subsurface internal armor using carbon nanotubes and similar advanced materials. It will fool a casual observer but even rudimentary sensor technology (x-rays, sonograms, etc.) will detect that the wearer is more than they seem. It thus combines the benefits of the Biological Option with the Armored Option at a much higher cost. It cannot be combined with the Armored Option or the Biological Option. Characters can wear normal armor and protective suits over armored cyberware.

⯈ **Example:** *A normal Cyberhand with the Locking Grip option costs 3500 credits (2500 credits for the hand plus 1000 credits for the option). A Cyberhand with the Armored Biological Option (+3 DB) and Locking Grip costs 76,000 credits (2500 x30 plus 1000).*

Biological Option: This enhancement uses synthetic skin and equivalent materials to give cybernetics the outward look and feel of their biological equivalents. This will fool a casual observer but even rudimentary sensor technology will detect that the wearer is more than they seem. This option doubles the base cost of a

cyberware unit. It cannot be combined with the Armored Option or the Armored Biological Option.

❽ **Example:** *A normal Cyberfinger has a base cost of 500 credits. This option doubles that to 1000 credits.*

EMP Shielding: This provides a bonus to Electronic RRs made against electromagnetic pulses and radiation. The cost is expressed as a multiplier of the base unit cost of the device.

Table 3.8 Cyberware EMP Shielding		
	Bonus	Cost
Early	+5	x5
	+10	x10
Mature	+15	x15
	+20	x20
	+25	x25
	+30	x30
Advanced	+35	x35
	+40	x40
	+45	x45
	+50	x50

❽ CYBERWARE BONUSES

The bonuses available through the use of cyberware are limited by the technological stage of development.

Amplifiers and Enhancers: These can provide a +5 bonus to specific sense-based Perception maneuvers at the Early stage of cybertechnology, up to +15 at Mature, and up to +25 at Advanced.

Boosters: These have maximum stat bonuses as follows: +5 at Early, +10 at Mature, and +15 at Advanced. Boosters may only be activated once per hour at Early, twice per hour at Mature, and four times per hour at Advanced. Each boost only lasts for one minute.

Cyberarms (Agile Arm, Fast Arm, Strong Arm): These options have maximum stat bonuses as follows: +5 at Early, +15 at Mature, and +25 at Advanced.

Cyberlegs (Agile Leg, Fast Leg, Strong Leg): These options have maximum stat bonuses as follows: +5 at Early, +15 at Mature, and +25 at Advanced.

❖ **Note: The stat bonuses from multiple cyberlimbs do not stack, e.g. a +10 Agility bonus from an Agile Arm and a +5 Agility bonus from an Agile Leg does not give a cumulative +15 bonus. Similarly two Fast Arms with +10 Quickness bonuses each does not entitle the possessor to a +20 bonus. Instead, use the relevant stat bonus according to the nature of the maneuver or attack being attempted, e.g. use the Agile Arm bonus for shooting, the Agile Leg for a Jumping maneuver. If the character attempts a maneuver that requires both arms/hands (e.g. two-handed weapons) or both legs (e.g. running rather than hopping), but only**

one arm or leg is enhanced, then the stat bonus from the enhanced cyber limb is ignored.

Protectors: These can provide a +5 bonus to specific Resistance Rolls at the Early stage of cybertechnology, up to +15 at Mature, and up to +25 at Advanced.

Skill Expertise: These provide additional "virtual" skill ranks to their possessor. The maximum additional skill ranks available through this technology are: 2 at Early, 6 at Mature, and 10 skill ranks at Advanced. These skill ranks behave according to the standard rule for skills, so a character with many real skill ranks will not gain as much numeric benefit from this option as someone with few or no skill ranks, e.g. a character with a Skill Expertise option granting 6 skill ranks for Xenology who already has 10 skill ranks will gain a +12 skill bonus, whereas someone with no actual skill ranks and the same cyberware would have a skill rank bonus of +30. A host is limited in the number of Skill Expertise packages that may be downloaded into neuralware: 4 at Early, 8 at Mature, and 12 at Advanced. Each distinct skill requires a distinct Skill Expertise package (and associated Cyber Control skill ranks).

❽ SysOp's Note: Skill Expertise Cyberware Option

The Skill Expertise neuralware option may not be used for the Endurance or Psi Energy Development skills. Combat, Concentration, and Subterfuge skills should normally be considered Restricted options. Skill Expertise packages can be swapped out to make room for alternative skills – new Cyber Control skill ranks must be purchased for new skills. At a later date, an old skill could be swapped back in – in this case, no new Cyber Control skill ranks must be purchased but the host must "sleep" before being able to use the old skill package.

❽ IMPLANTS/ AUGMENTATION

Data Jack: Externally this is a socket allowing the wearer to be literally wired into computers and other machinery. Internally it connects directly to the host's brain and is normally sited at the base of the skull.

Fiber Hair: This artificial hair is made from optical fibers and glows with its own light. It can change color according to preset programming or (if the wearer has a Neuralware Implant) can be altered at will by the wearer.

Nanotattoo: Created using nanites implanted within the wearer's skin, nanotattoos can change color and pattern according to preset programming or (if the wearer has a Neuralware Implant) can be altered at will by the wearer. The latter allows the nanotattoo to be used as a dermal display of information from the implant. Nanotattoos can even be made temporarily invisible.

Neuralware Implant: This nanotech-based implant is injected into the host's bloodstream where it eventually coalesces to form a central processing hub in or near the host's brain. Tendrils from the hub then extend throughout the host's central nervous system

(or equivalent) and beyond, providing a neural linkage to all other implanted cyberware. Certain cyberware devices and upgrades require a neuralware implant to be present in order for their hosts to operate them. This implant can be used to connect wirelessly (i.e. using short-range radio) to external computers and data networks. Individuals with this implant can communicate with others who have similar augmentation, sending words, images, or data. The range is 5m (Early), 10m (Mature) and 20m (Advanced).

Audio Enhancer: This option boosts the host's effective hearing through post-processing of sounds received through the host's (artificial or natural) ears. The bonus is applied to all hearing-based Perception maneuvers.

Bloodstopper: This feature allows the host to stop bleeding by consciously accelerating blood clotting, increasing arterial constriction, etc. The host can reduce bleeding at a rate of 1 hit per 2 rounds on a single injury, e.g., a wound bleeding at a rate of 3 hits per round will be reduced to 2 hits after 2 rounds, 1 hit after 4 rounds, and completely stopped after 6 rounds. A Bloodstopper may only be activated once per hour at Early, twice per hour at Mature, and four times per hour at Advanced.

Cooordination Booster: This increases the host's sensory-manipulator coordination and overall agility. This equates to a temporary stat bonus to Agility.

Cryptocomms: This option allows for secure communication using advanced encryption/decryption schemes between implanted hosts and from/to conventional computers and networks. This also provides a bonus to Signaling: Mathematical Encoding (Early: +5, Mature: +10, Advanced: +15) This option is a Restricted technology.

EMP Biofeedback: This option allows the host to develop the Electronic Resistance skill.

Focus Booster: This increases the host's mental concentration. This equates to a temporary stat bonus to Self Discipline.

Intuition Booster: This increases the host's intuitive and creative faculties. This equates to a temporary stat bonus to Insight.

Knowledge Package: This option provides the character with a Limited Archive (see HARP SF, Chapter 9, Computer Issues). The number of Knowledge Packages that can be installed in a neuralware implant varies according to technology stage: 1 at Early, 2 at Mature, and 4 at Advanced.

Logic Booster: This improves the host's logical and rational thought processes. This equates to a temporary stat bonus to Reasoning.

Memory Recording: This enables the host to transfer memories, sensory stimuli or digital data between the implant itself and the host's brain. The host can delete information in either the implant or the brain.

Mind Control: This option allows someone else to control the behavior of the host via the neural implant. Normally this will be delegated to a complex, but not intelligent, program that will deny the host free will until the control option is erased. This is a Restricted technology.

Olfactory Enhancer: This option boosts the host's effective sense of smell through post-processing of scents detected through the host's (artificial or natural) nose. The bonus is applied to all smelling-based Perception maneuvers.

Organ Control: This option allows the host to monitor and control natural organs via the neuralware implant – useful for stabilizing one's heart rate when monitored by a polygraph or reducing digestive efficiency so that overindulging in chocolates does not lead to weight increases!

Painblocker: This feature allows the host to consciously isolate and minimize pain. The host can temporarily halve the maneuver penalties of any injuries sustained. A Painblocker may only be activated once per hour at Early, twice per hour at Mature, and four times per hour at Advanced. Each block only lasts for one minute.

Sense Enhancer: This option boosts one of the host's exotic senses (such as heat vision or ultrasound echolocation) through post-processing of sensory stimuli. The bonus is applied to all Perception maneuvers involving the specific sense.

Sense Receiver: This option enables the host to receive and interpret transmitted sensory data from someone else who has a Sense Transmitter cyberware option. Unlike using a sensable projector, the host can handle their own sensory stream and the received stream simultaneously (albeit at a –20 penalty). Each sense requires a separate Sense Receiver. This option is a Restricted technology.

Sense Transmitter: This option enables the host to transmit received sensory data in real-time from one sense via the neuralware network. It is used in certain reality holovision/sensable shows rather than sensable bodysuit recorders, as well as by explorers, commandos on point, reporters, etc. Each sense requires a separate Sense Transmitter. The cyberware ranks grant the host the ability to choose when and what to transmit. Illegal and security versions of this option give the host no control over what is transmitted – typically used as a surveillance method on prisoners, informants, etc., - although they require no cyberware skill on the part of the host. All forms of this option are Restricted.

Skill Expertise: This option augments the host's expertise with a specific skill, by providing additional "virtual" skill ranks" that contribute skill rank bonuses according to the normal rules. Using Skill Expertise, a character can exceed the maximum number of skill ranks allowed for his level. Each skill requires a separate Skill Expertise option.

Social Booster: This improves the host's sense of self and social adaptability. This equates to a temporary stat bonus to Presence.

Speed Booster: This increases the host's reflex speed. This equates to a temporary stat bonus to Quickness.

- **Stamina Booster:** This allows the host to draw on reserves of energy and physical stamina. This equates to a temporary stat bonus to Constitution.

- **Strength Booster:** This option gives the host temporarily heightened strength. This equates to a temporary stat bonus to Strength.

- **Stunblocker:** This feature allows the host to use adrenalin surges to protect against stun effects. A Stunblocker may only be activated once per hour at Early, twice per hour at Mature, and four times per hour at Advanced. Each block only lasts for one minute, but during this period the host cannot be stunned. This option is a Restricted technology.

- **Tactile Enhancer:** This option boosts the host's effective sense of touch through post-processing of sensations perceived through the host's (artificial or natural) nerve endings. The bonus is applied to all touch-based Perception maneuvers.

- **Taste Enhancer:** This option boosts the host's effective sense of taste through post-processing of stimuli received through the host's (artificial or natural) tongue. The bonus is applied to all taste-based Perception maneuvers.

- **Vision Enhancer:** This option boosts the host's effective sight through post-processing of visual stimuli received through the host's (artificial or natural) eyes. It can be used to correct for common eyesight problems such as long-sightedness or shortsightedness. The bonus is applied to all vision-based Perception maneuvers.

Subdermal Pouch: This is a concealed skin pouch with enough room for relatively small items. Possible items that would fit are one or two removable storage disks, a set of lock picks, a sachet of medicine, a small tool, or at a squeeze, a minilaser or a holdout gun. The seam may appear to be a normal scar or be invisible to casual scrutiny.

✪ Cyberarms

Cyberarm: This is a cybernetic limb replacement for an arm (or an equivalent manipulator limb in nonhuman species), but does not include the actual hand. It is capable of performing all the movements that could be achieved by an organic equivalent. This basic form is, however, no stronger, no faster, nor more dexterous than the original limb that it replaces. Such enhancements require special upgrade options (see below) in order to avoid dangerous strain on the host's body where the limb interfaces with flesh. Cyberhands are sold separately from Cyberarms.

- **Agile Arm:** This upgrade option allows the cyberarm to be more dexterous than its organic original, giving a stat bonus to Agility-based maneuvers involving the use of the limb.

- **Built-in Weapon:** This is an actual weapon built into the cyberlimb. It can be designed to emerge from the upper surface of the arm; alternatively the cyberhand can flip down exposing the muzzle of a ranged weapon or the blade of a vibroknife or vibrosword. Suitable weapons for this option are stunclubs (where the whole arm is the "club"), vibroknives,

vibroswords, any one-handed projectile weapons, and any one-handed energy weapons (except flame pistols). This is a Restricted option.
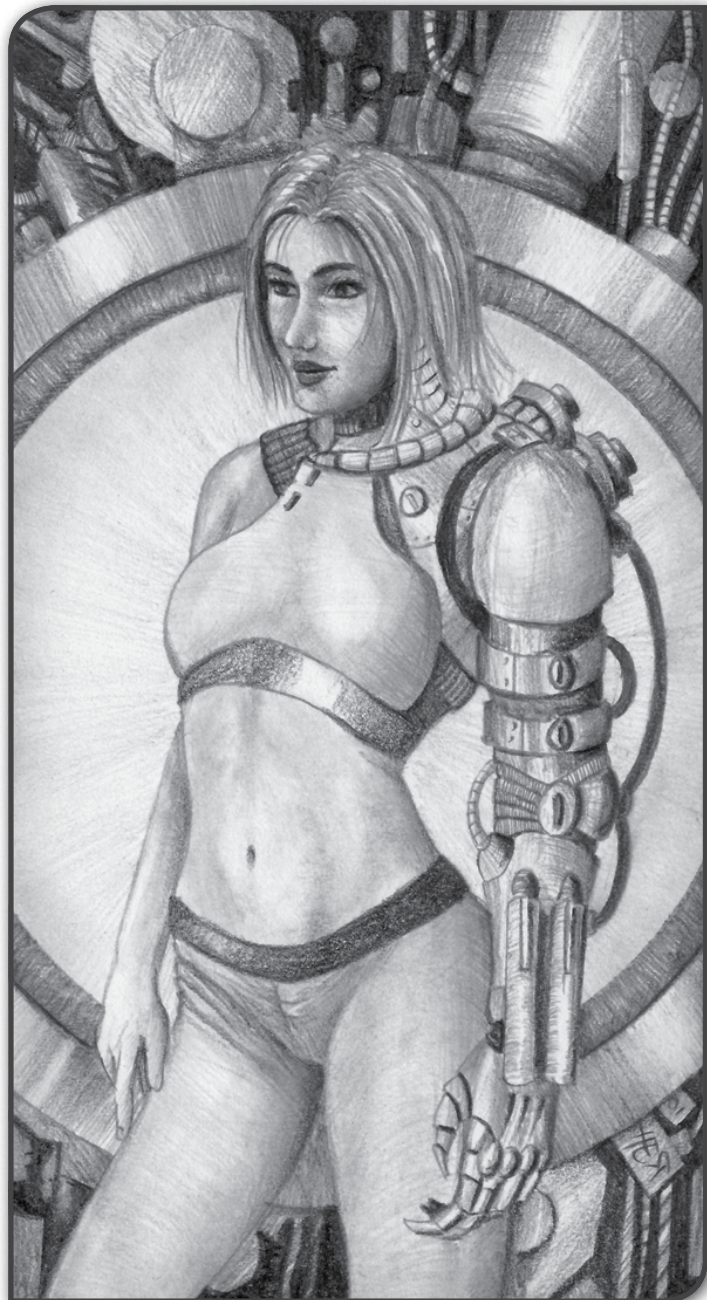
- **Concealed Cavity:** This is a hidden storage compartment within the cyberarm that can be used to hide one or two small items, such as a set of storage disks, small tools, medicines, power minicells, a minilaser or a holdout gun.

- **Extra Arm:** This is actually the cybernetic rewiring of the body to create a new socket and artificial nerve pathways for an additional limb rather than the limb itself. It must be purchased with any Cyberarm that is intended as an extra limb. A neuralware implant will be required to use an Extra Arm.

- **Fast Arm:** This upgrade option allows the cyberarm to be faster than its organic predecessor, giving a stat bonus to Quickness-based maneuvers involving the use of the limb.

- **Strong Arm:** This upgrade option allows the cyberarm to be stronger than the original arm, giving a stat bonus to Strength-based maneuvers involving the use of the limb.

Cyberfinger: This is a cybernetic finger (or equivalent digit for nonhumans) and is normally an individual replacement for a single finger or thumb. Cyberhands do come with the normal number of digits.

- **- Built-in Weapon:** A conventional knife blade or a vibroknife can be extended from the tip of the cyberfinger. Alternatively the cyberfinger can be a disguised minilaser or miniature handgun (up to 2 bullets) – the "fingertip" flips open to reveal the muzzle. This is a Restricted option.

- **Scanner Option:** This allows a miniature computer-controlled scanner to be fitted into a cyberfinger socket (instead of a standard cyberfinger). The host can swap between standard cyberfinger and cyberscanner with a Routine Machine Operation or Routine Engineering (Cybernetics) maneuver. Swapping takes 5 rounds to complete. A neuralware implant is required to operate this option.

- **Tool Option:** This allows a small computer-controlled tool (such as a screwdriver) to be fitted into a cyberfinger socket (instead of a standard cyberfinger). The host can swap between standard finger and cybertool with a Routine Machine Operation or Routine Engineering (Cybernetics) maneuver. Swapping takes 5 rounds to complete. A neuralware implant is required to operate this option.

Cyberhand: This is a cybernetic equivalent of a human hand (or alien analogue). It can be sold separately or as an attachment to a cyberarm or (occasionally) a cyberleg. It is capable of performing all the movements available to an organic hand and includes all the necessary digits.

- **Built-in Weapon:** This option adds a weapon capability to one of the fingers of the cyberhand. The cyberfinger tip can either extrude a conventional knife blade or a vibroknife; alternatively the finger can be a concealed minilaser or miniature holdout gun (up to 2 bullets). This is a Restricted option.

- **Extra Hand:** This is actually the cybernetic rewiring of the body to create a new socket and artificial nerve pathways for an additional hand rather than the limb itself. It must be purchased with any Cyberhand that is intended as an extra hand, even if that cyberhand is to be attached to a cyberarm. Humans, for instance, normally only have one hand at the end of their arms. A neuralware implant will be required to use an Extra Hand.

- **Locking Grip:** This allows the cyberhand to clamp itself to an object in a vise-like grip, equating to a bonus versus disarm attempts and to all maneuvers requiring a sound grip on the object. Bonus is Early +10, Mature +20, Advanced: +30.

- **Scanner Option:** This allows a miniature computer-controlled scanner to be fitted into the finger sockets of a cyberhand or a larger scanner to be slotted into the "wrist" socket of a cyberhand. The host can swap between scanner modes and conventional "hand" with a Routine Machine Operation or Routine Engineering (Cybernetics) maneuver. Swapping takes 5 rounds to complete. A neuralware implant is required for this option.

- **Tool Hand:** This allows a set of computer-controlled tools to be fitted into the finger sockets of a cyberhand or a larger tool (such as a laser cutter) to be slotted into the "wrist" socket of a cyberhand. The host can swap between tool modes and conventional "hand" with a Routine Machine Operation or Routine Engineering (Cybernetics) maneuver. Swapping takes 5 rounds to complete. A neuralware implant is required for this option.

⚙ Cyberlegs

Cyberfoot: This is a cybernetic equivalent of a human foot (or alien analogue). It can be sold separately or as an attachment to a cyberleg. It is capable of performing all the movements available to an organic foot.

- **Extra Foot:** This is actually the cybernetic rewiring of the body to create a new socket and artificial nerve pathways for an additional foot rather than the limb itself. It must be purchased with any Cyberfoot that is intended as an extra foot, even if that cyberfoot is to be attached to a cyberleg. Humans,

for instance, usually only have one foot at the end of each leg. A neuralware implant is required to operate this option.

☐ **Hand Option:** This is the cybernetic rewiring necessary to allow a cyberhand to be implanted at the end of a leg or cyberleg and used as another hand. This option is sometimes used by cyborgs who live entirely in microgravity environments – extra hands are more useful than feet for them. A neuralware implant is required for this option.

Cyberleg: This is a cybernetic limb replacement for a leg (or an equivalent limb used for locomotion in nonhuman species), but does not include the actual foot. It is capable of performing all the movements that could be achieved by its organic equivalent. This basic form is, however, no stronger, no faster, nor more dexterous than the original limb that it replaces. Such enhancements require special upgrade options (see below) in order to avoid dangerous strain on the host's body where the limb interfaces with flesh, and only function properly if all of the host's legs are cyberlegs with the same Agile, Fast and/or Strong Leg upgrades. Cyberfeet are sold separately from Cyberlegs.

☐ **Agile Leg:** This upgrade option allows the cyberleg to be more dexterous than its organic original, giving a stat bonus to Agility-based maneuvers involving the use of the limb.

☐ **Concealed Cavity:** This is a hidden storage compartment within the cyberleg that can be used to hide one or two small items, such as a set of storage disks, small tools, medicines, power minicells, a minilaser or a holdout gun.

☐ **Extra Leg:** This is actually the cybernetic rewiring of the body to create a new socket and artificial nerve pathways for an additional limb rather than the limb itself. It must be purchased with any Cyberleg that is intended as an extra limb. A neuralware implant is required for this option.

☐ **Fast Leg:** This upgrade option allows the cyberleg to be faster than its organic predecessor, giving a stat bonus to Quickness-based maneuvers involving the use of the limb.

☐ **Strong Leg:** This upgrade option allows the cyberleg to be stronger than the original leg, giving a stat bonus to Strength-based maneuvers involving the use of the limb.

⊕ Cybersenses

Cyberear: This replaces an auditory organ of the host and may include a cybernetic external "ear" to house the aural sensor. In the latter case, the external ear can have discreet controls for manually controlling the cyberear and any options instead of or in addition to linkage to a neuralware implant.

☐ **Amplifier:** This increases the sensitivity of the cyberear enabling the host to hear fainter sounds. However, all detected sounds increase in loudness, so the host can be "mentally" deafened.

☐ **Antisonic:** This functions exactly like a Sonic Neutralizer (see HARP SF Chapter 8). It is a Restricted technology.

☐ **Antisound:** This allows the host to edit out particular sounds at the cyberear before they are passed on to the host's brain.

Very useful for tuning out loud noises in order to eavesdrop.

☐ **Directional Pickup:** This enables the cyberear to focus on detecting sounds originating from a particular direction. Any bonus to Perception maneuvers granted via an Amplifier option is doubled when listening in the targeted direction. Similarly Perception maneuvers to hear sounds from elsewhere are penalized by an equal amount.
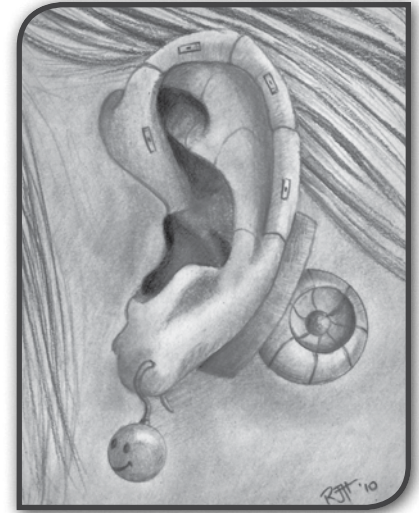
☐ **Infrasound:** This upgrade enables the host to hear sounds at frequencies below the character's normal hearing range (for humans, this would allow them to hear much terrestrial whale and elephant communication).

☐ **Ultrasound:** This upgrade enables the host to hear sounds at frequencies above the character's normal hearing range (humans could hear the squeaks of rodents and bats for instance.)

Cybereye: This replaces a visual organ of the host. It may include discreet controls for manually controlling the cybereye and its options instead of or in addition to linkage to a neuralware implant.

☐ **Antidazzler:** This options functions exactly as a Dazzle Neutralizer (see Chapter 8). It is a Restricted technology.

☐ **Antiglare:** This option enables the cybereye to compensate immediately for conditions of extreme brightness, as may be experienced in snowfields, deserts, and internal environments with intense lighting.

☐ **Extra Eye:** This is actually the cybernetic rewiring of the body to create a new socket and artificial nerve pathways for an additional eye rather than the eye itself. It must be purchased with any Cybereye that is intended as an extra limb. A neuralware implant is required for this option.

☐ **Low Light:** This option permits the cybereye to see in extremely poor lighting. The host can see clearly up to 30m (Early: 15m, Advanced: 60m) on a starlit night and up to 150m (Early: 75m, Advanced: 300m) from the light of a full moon. In an interior setting, with artificial illumination, the character can see clearly up to triple (Early: double, Advanced: four times) the normal radius of the lighting. Characters can also see dimly (-40 to Perception rolls) an additional distance equal to the illumination of the light source. There must be some light for this option to function.

☐ **Microvision:** This option turns the cybereye into an optical microscope, capable of 1000x magnification (500x Early, 2000x

Advanced) on objects no more than 20cm away from the eye. It makes reading microfilm, microfiche cards, and microdots a snap. Characters receive a +20 bonus (Early: +10, Advanced: +40) to Perception and Forensics maneuvers for noticing tiny objects and collecting microscopic evidence.

☐ **Motion Sensing:** This option allows the cybereye to detect even slight movements within its normal visible range. Characters receive a +20 bonus (Early: +10, Advanced: +40) to Perception maneuvers against moving objects or people.

☐ **Peripheral Sight:** This option gives the cybereye a controllable "fish eye lens". This prevents the host from being flanked and enemies only receive a +10 Rear bonus for attacking the character from behind.

☐ **Spectral Range:** This option allows the host to see extreme portions of the spectrum beyond infrared and ultraviolet. This option may be chosen multiple times for separate wavelength bands, i.e. radio waves, microwaves, X-rays, and gamma radiation.

☐ **Telescopic Focusing:** This enables the host to focus on a feature in their field of vision, magnifying it multiple times at the expense of everything else in the field of view. The process takes a round to focus in on the target and grants a +20 bonus (Early: +10, Advanced: +40) to Perception maneuvers involving the target. It also reduces the penalties due to Range Increments by 20 (Early: 10, Advanced: 40) for Sniping maneuvers and Well-aimed Shot Combat Actions. It increases the number of Range Increments at which Sniping may be attempted (Early: +3 to 5 RIs, Mature: +4 to 6 RIs, Advanced: +5 to 7 RIs) – non-cumulative with any other technology. While focused, the character suffers a –20 modifier to Perception maneuvers relating to other features or targets.

☐ **Thermal Imaging:** This allows the host to see in the infrared portions of the spectrum, generating a visual image of the surroundings according to their temperature. Objects and creatures at higher or lower temperatures than the ambient will be revealed very clearly in this mode. No illumination is required to use thermal imaging but, unless the host can also "see" the surroundings normally, Perception maneuvers suffer a –40 penalty.

☐ **Ultraviolet:** This option enables the host to see in the ultraviolet portion of the spectrum, which can be helpful for seeing the fluorescence given off by some chemical reactions (as used in forensics) and special paints.

☐ **Underwater:** This upgrade option compensates for the different lighting conditions underwater, enabling the host to see normally in aquatic environments.

Cybernose: This replaces the natural olfactory organ with a cybernetic equivalent. This cyberware unit can encompass the entire nose.

☐ **Amplifier:** This upgrade option increases the sensitivity and directionality of the cybernose. It is most easily controlled by a neuralware implant.

☐ **Antiscent:** This upgrade option allows the cybernose to edit out overpowering scents enabling trace odors to be detected. It must be controlled via a neuralware implant.

☐ **Filtration:** This upgrade option allows the cybernose to filter out airborne particles and toxins, thus preventing them from entering the airways. Humans need to remember to breathe through their cybernose – likewise for other species with multiple paths to their airways. It must be controlled via a neuralware implant.

Cybersense: This unit replaces an exotic sense (such as an electrical sense or magnetic sense) with a cybernetic replacement. Characters who did not have this sense naturally require a neuralware implant to control and comprehend the input from the unit.

☐ **Amplifier:** This option improves the sensitivity and other relevant quality characteristics of the cybersense. A neuralware implant is the easiest means of switching the amplifier on or off.

☐ **Filter:** This option allows the host to edit out specific categories of sensory stimuli from the cybersense via the neuralware implant.

Cybersonar: This is the cybernetic equivalent of the ultrasound echolocation used by terrestrial bats and the sonar of dolphins. The host can transmit ultrasound pulses and detect the reflected echoes as they bounce off surfaces. The pulses have a range of 0.5 km in air and 1 km in water. The host's brain interprets the pulses as a three-dimensional image. Characters who did not have a natural sonar sense will require a neuralware implant to control and comprehend the input from the unit.

☐ **Amplifier:** This upgrade improves the sensitivity of the apparatus in transmission and reception of pulses. It may be neurally controlled.

☐ **Filter:** This neurally controlled option allows the cybersonar unit to filter out undesirable signals.

Cybertongue: This replaces all of a host's taste buds with a cybernetic tongue.

☐ **Amplifier:** This enhances the sensitivity of the cybertongue and may be controlled via a neuralware implant.

☐ **Filter:** This option allows the host to ignore particular tastes by having the cybertongue edit out the associated sensory stimuli from the data stream. This option must be controlled by a neuralware implant.

Cybertouch: This is a web of nanite tendrils that spread throughout the host's body and interleave themselves (or replace entirely) the nerve endings responsible for the sense of touch.

☐ **Amplifier:** This option heightens the sensitivity of the artificial nerve endings and can be switched on and off by an implant.

☐ **Filter:** This option allows the cybertouch unit to remove specific sensory stimuli from the data stream. Like all such options, this can lead to a false sense of safety – a host could edit out sensations relating to extreme temperatures and suffer a horribly burnt or frostbitten hand.

✪ Miscellaneous Replacements

Artificial Organ: This can be either the cybernetic equivalent of a natural organ (such as heart, liver, lungs, etc.) interfaced to the organic body or a new organ (such as gills on a human.) If the host has a Neuralware Implant, then he can control its functioning.

Cyberhead: This cyberware replaces the head and neck (or alien equivalent) of the host. Effectively the host's brain is transplanted into the cyberhead and kept alive by the cyberhead. Individuals who risk a cyberhead implantation must already have had the rest of their body (torso and limbs) converted to cyberware. Cybersenses may be incorporated into the cyberhead but their cost is not included in its price. This cyberware is Restricted.

Cybertorso: This cyberware converts a biological entity almost into a robot. It replaces the chest, stomach and abdomen (or alien equivalents) with a robotic torso that is interfaced with the head and neck of the host. Anyone who undertakes this cyberware conversion will also need a complete set of cyberlimbs as the artificial organs within the cybertorso are only sufficient to keep an organic head alive. This cyberware is Restricted.

Cybervoice: This is the partial or complete cybernetic replacement of the voicebox (or equivalent alien anatomy).

- ❏ **Amplifier:** This option allows the host to project his voice with greater loudness than normal. In game terms, this equates to a bonus to appropriate voice-based maneuvers (normally Artistic skills or Public Speaking), which has the following maxima: +10 bonus (Early), +30 (Mature) and +50 (Advanced). The bonus assists in being heard; it should not be applied to determine whether a listener is impressed or convinced by the host.

- ❏ **Emulator:** This Restricted option enables the host to duplicate the voice patterns of other species and specific individuals. A human equipped with an emulator could mimic dolphin speech or whale song or impersonate a celebrity's voice. Software for each species or individual pattern must be purchased separately at 1000 credits per pattern and downloaded via a neuralware implant. Early Emulators can retain 5 patterns simultaneously; Mature can hold 10, and Advanced 20.

- ❏ **Modulator:** This option allows the host to vary the pitch of his voice up and down multiple octaves, so he can sing like a soprano or a bass at will. It can also be used for subvocalisation, where the host speaks extremely quietly, usually for the benefit of a very near microphone. Control is normally exercised via a neuralware implant.

Disease Protector: This option provides the host with a suite of specialist immuno-nanotech that enhances the host's natural defenses against diseases (i.e. a bonus to Stamina RRs versus diseases). The nanobots may be collectively controlled via a neuralware implant.

Electrical Protector: This option provides the host with a full-body protection against electrical-based attacks, damage and effects, represented as a bonus to Stamina and Electronic RRs. The option may be controlled via a neuralware implant.

Medication Organ: This is an additional cybernetic organ, which can synthesise one specific medication (or drug) and administer inernally the medication/drug on demand. The organ can produce one dose per hour at Early, two doses per hour at Mature, and four doses per hour at Advanced. Each medication organ can only produce and deliver one specific substance. This option must be controlled by a neuralware implant, and is a Restricted technology.

Poison Protector: This option provides the host with a suite of specialist immuno-nanotech that enhances the host's natural defenses against poisons (i.e. a bonus to Stamina RRs versus poisons). The nanobots may be collectively controlled via a neuralware implant.

Sonic Protector: This option provides the host with a full-body protection against sonic attacks, damage and effects, represented as a bonus to Stamina and Electronic RRs. The option may be controlled via a neuralware implant.

Specific Device: This is a (normally minaturised) device implanted somewhere in the host's body, and normally controlled by the host's neuralware (if the host has control over the device.) Typical devices include satellite navigators, short-range communicators, electronic trackers, etc. This option also covers similar devices that the host has no control over (i.e. trackers implanted in prisoners) and hence needs no cyberware ranks to manage, and more malign possibilities such as surgically implanted bombs (treat as grenades) and implanted electrostunners (for stunning the host on demand) that can be remotely activated, either by radio or compromised neuralware.

✪ SysOp's Choice: Full Body Conversions

Cybertorso and cyberhead devices are included for completeness, but make the host character effectively a robot. Some SysOps may therefore prefer that players who want the mind of an originally organic character in a robotic body should have their character uploaded into virtual format and downloaded into a normal robot body.
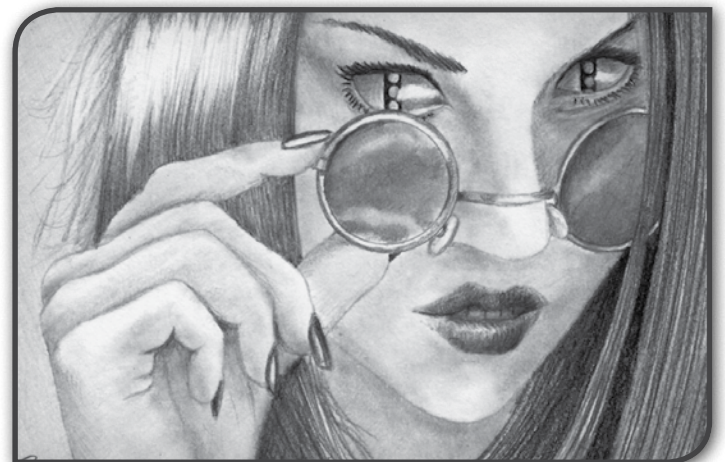
ELECTRONIC CHARACTERS

In HARP SF, heroes no longer need flesh-and-blood bodies to make a difference in the universe. Individuals can upload their minds and memories into the virtual reality of cyberspace, achieving a form of immortality. Artificial intelligences and virtual characters are downloaded into the processors of starships and robots, creating truly sentient machines.

ELECTRONIC CHARACTERS: VIRTUAL PERSONS AND AIS

There are two types of Electronic Characters: Virtual Persons and AIs.

A Virtual person is a software construct that incorporates the personality and memories of a sentient biological individual. The mind of the original person is recorded, translated into a highly complex program and database suite of memories and experiences, and then uploaded onto a planetary computer network. The virtual persona then "lives" in the world of cyberspace, but can indirectly experience and interact with the real universe through computers, computer-controlled equipment, and sensors.

An Artificial Intelligence (AI for short) is also a sentient software construct. An AI differs from a Virtual person in that the AI is a pure creation of software, which has never experienced a biological existence. Some AIs reside in cyberspace as data collectors, information analyzers, network managers, and system guardians. Other AIs are downloaded into the bodies of robots and the computers of vehicles as their artificial minds.

CREATING A VIRTUAL CHARACTER

Creating a Virtual persona from a biological individual is a complex, expensive and time-consuming process. The individual must have a datajack or a neuralware implant already installed so that he can be interfaced to the recording machines. A comatose state is then induced so that the recorders can explore and copy the person's lifetime of memories at extremely high speed into a tabula rasa software program, recreating personality and experiences without the pain of reliving traumatic events.

The recording process varies in length according to how old the person is. Older people have more memories to record so the process takes more time.

❑ Early personality recording requires 3 days for each year that the person has been alive.

❑ Mature personality recording requires 2 days for each year that the person has lived.

❑ Advanced personality recording requires only 1 day for each year of life.

❑ The cost of the process is 50,000 credits plus 1,000 credits for each day spent in the recording process.

In addition to the time and the expense, the transition to virtual status represents a huge shift in mental perspective. This adjustment is reflected by the Virtuality Talent, which must be taken by all virtual characters on completing the process. In game terms, the original organic character can "save up" the Development Points prior to transition or the virtual character must spend the first twenty Development Points accumulated in "virtual" form on the Virtuality Talent.

✪ SysOp's Choices: One-off Recording Versus Snapshots in Time

The SysOp must decide whether the recording process is a one-way transfer of the person into software or a copying of the person.

If the process is a transfer, then the person's mind moves completely into cyberspace, leaving the body an empty husk. Although medical science can preserve the body for a very long time, the character's existence is almost certainly finished as a biological entity and the character is committed to being a virtual character.

If the process is a duplication, then the person's mind is copied at that point in time, creating a virtual copy of the biological character, who can then go back to living his normal life. The character now exists both as a biological and a virtual life form. If personality recording is being used as a life insurance policy in the setting, then the virtual character will simply be stored until such time as the biological character is irrevocably dead. The virtual persona will then be activated and the character will "live" again, at least in cyberspace.

Note that the virtual persona will only have the stats, skills, and Talents at the time of the recording. Thus a character who has his personality copied at 5th level and placed in storage, but reaches 10th level before suffering an untimely end, will have to revert back to being a 5th level virtual character and will only remember what happened up to the point of recording. (Keep old versions of the character sheet or the SysOp may rule that the virtual archive has been corrupted!)

Where personality recording is a copying process, SysOps should allow characters to update their virtual personas on a regular basis. Updates should be performed on a yearly basis (player-characters should be updated on level advancement) and will cost 5,000 credits plus 1,000 credits per day of recording. Update recordings take 3 (Early), 2 (Mature) or 1 (Advanced) day per new year (or level) of experience to be stored.

Some SysOps may allow players to run biological and virtual versions of a single original character simultaneously. In this case, the two instances will diverge (as they each gain experience) and become two separate characters. It will not be possible to reintegrate the two versions into a single individual.

Likewise, creating multiple active copies of a Virtual character has similar difficulties. It is technically feasible to create them but it is not possible to recombine the distinct experiences of individual copies into a single version at a later date without driving the virtual persona completely insane.

✪ Tintamar Knowledge Base:
State of the Art

In the Terran Federation, personality recording is a technology that has only just reached Mature status. The legal status of virtual characters is still disputed. Earth and the other solar governments have ruled that virtual persons have all the rights and responsibilities of biological persons, if they are no longer alive in an organic body. Where a biological person also has a virtual recording, the virtual person is considered to be subordinate to the living person and must normally be inactive. Elsewhere in the Federation, virtual persons are not generally considered to be citizens yet and have minimal rights. There are virtual persons in Federation service and they are accorded full status by their respective organizations.

As personality recording is a copying process, many of the super-rich are regularly creating and updating their virtual personae as one means of attaining a form of immortality. The long-term implications for human society and economics of immensely wealthy virtual immortals are as yet unknown. According to some sources, certain megacorporations require their explorer teams and executives to undergo regular personality recording. These recordings are then probed to discern any information that the employee may have withheld from their employers.

Of the other known species, only the Cerans have a significant virtual population, who are considered full citizens. Virtual Madji are relatively few in number and do not have full rights – although they may be consulted for their wisdom.

VIRTUAL CHARACTERS: STATS, SKILLS, AND TALENTS

Virtual characters who reside in cyberspace or who are downloaded into standalone computers on planetary vehicles, spacecraft of any type, colony base mainframes, etc., but not robots or biological creations, only have the 4 mental stats: Insight, Presence, Reasoning and Self Discipline. These stats retain the values and total bonuses they had when the virtual character was created. The other four physical stats of Agility, Constitution, Quickness and Strength are reset to the notional value of 50 (+0 stat bonus) to reflect the lack of a normal body. The physical stats also forfeit any racial stat bonuses and special bonuses. Under the preferred Flat DPs per Level option, virtual characters still receive 50 Development Points.
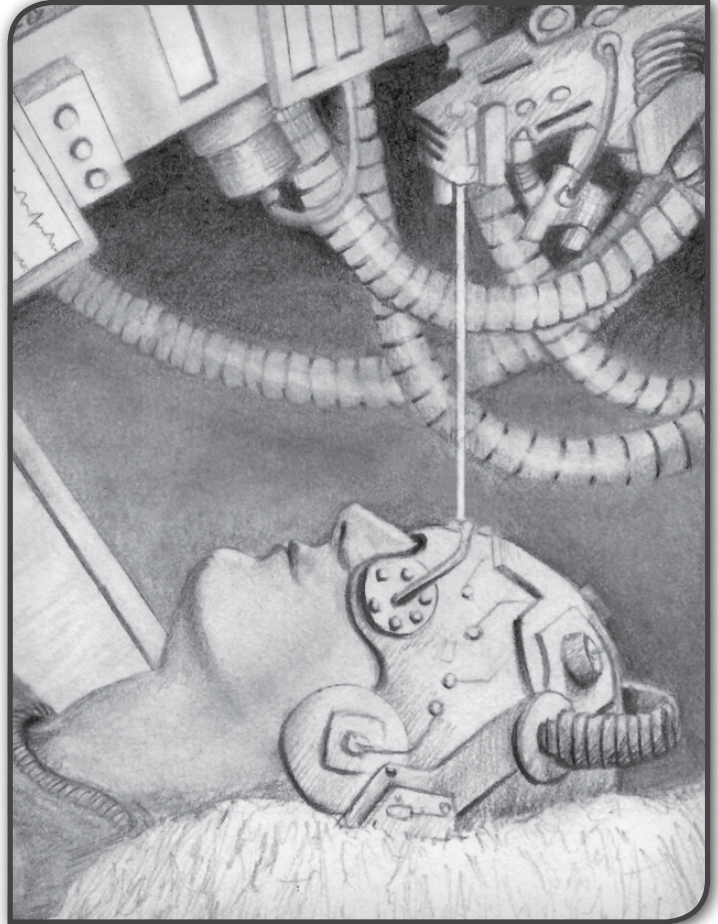
The virtual character retains all his existing skills. Note that skills, which are modified by one or more physical stats, must have their final totals recalculated. Although characters retain all their knowledge, using some of the skills may be impossible in certain forms, e.g. a Virtual persona in cyberspace cannot use Space Pilot, a Virtual persona downloaded into a starship can use Space Pilot but can't use Brawling skill, and neither can have an Endurance or a Resistance: Stamina skill. Virtual characters can develop the Resistance: Electronic skill. For psionic skills, see the sidebar.

The virtual character retains all his existing Talents, but may only sensibly benefit from mental talents (see Table 4.1 below for acceptable Talents). Asterisked Talents are psionic in nature and may not be available to Virtual characters.

Table 4.1 Electronic Character Talents	
Cost	Talent
15	Academic Specialization
10, 15, 20, 25 or 30	Active Psionic Field (*)
20	Additional Profession
10	Alien Affinity
20	Artistic
10	Artistic Prodigy
25	Bane
10	Calming Voice

Table 4.1 Electronic Character Talents	
Cost	Talent
20	Combat Awareness
15	Computer Wizard
20	Download Form
10	Fast Fixer
15	Gadgeteer
20	Greater Resistance (Will)
20	Hotshot Pilot
10	Improvisation
30	Instinctive Defense
30	Instinctive Evasion
10	Judge of Value
10	Knowledgeable Authority
5, 15, 30, 50 or 75	Latent Psionic Field (*)
10	Lesser Resistance (Will)
10	Lightning Reflexes
20	Logical Mind
10	Machine Affinity
15	Master Craftsman
5	Multiple Subskill Proficiency
5	Multiple Weapon Proficiency
15	Natural Gunner
10	Natural Linguist
20	Nullmind (*)
20	People Person
15	Physician
15, 25	Polyglot
20	Psionic Reach (*)
10	Psychic Reserve
20	Psychic Resolve
15	Quick Calculator
10	Quiet Mind (*)
15	Scholar
10	Shield Training
10	Skill Specialization
15	Spatial Boost (Radius) (*)
25	Spatial Boost (Targets) (*)
10	Speed Reader
20	Split Concentration (*)
10	Subconscious Discipline (*)
25	Sureshot
20	Survivalist
20	Temporal Boost (*)
15	Xenophile

Virtual characters gain the special Talents of Electronic Reflexes, Perfect Memory and Zero Sleep for free.

Electronic Reflexes: The character receives a special +15 bonus to Initiative.

Perfect Memory: Virtual characters record every moment of their existence. This includes all interactions with other entities in cyberspace and the real universe, and all sensory input. By making a Computer Operation maneuver, the character can recall the relevant pieces of information. Consider the virtual person's own memory to be a Total Archive for difficulty and time taken for searches (see HARP SF Chapter 9, Computer Issues).

Zero Sleep: Virtual persons have no need to sleep or rest and can function continuously without suffering fatigue.

In addition, Virtual characters may purchase any of the following Talents (from the Robotic Software and Communications section): Audio Processor, Cryptocomms, Focus Unit, Intuition Unit, Knowledge Package, Logic Unit, Logic Processor, Olfactory Processor, Sense Processor, Skill Expertise, Social Unit, Tactile Processor, Taste Processor, Visual Processor, Voice, Voice Amplifier, Voice Emulator, Voice Modulator. Some Virtual characters may already have cyberware software that achieves identical effects to these – Virtual characters may opt to retain their cyberware capabilities (including limits on use) or pay the difference in DPs and full price to upgrade to the Robotic equivalents.

✪ SysOp's Choice: Virtual Characters and Psionics

SysOps must decide whether psionic abilities are preserved during the personality recording process. This decision will depend on the underlying basis of psionics in the SysOp's campaign.

✪ Tintamar Knowledge Base: Virtual Characters and Psionics

No known species or civilization has the ability to transfer psionic abilities from a biological entity to a Virtual persona. It is not known whether psionic transfer is theoretically impossible or simply beyond current technology.

✪ SysOp's Note: Electronic Characters Versus Biologicals and Robots

Although "Pure" AI and Virtual persons do not have genuine physical stats, they still receive a full complement of their Development Points (so will have 50 Development Points under the Flat DPs per Level preferred option). This reflects the meta-game reality that levels are an abstraction of power. If the Stat Dependent DPs option is in play, then the total number of Development Points from the four mental stats should be doubled to maintain the equivalence of levels among all character types.

Some SysOps may consider that virtual/AI characters should pay some sort of price for not having physical bodies and for being effectively immortal. A possible option would be to double the number of Experience Points required by such characters for

Table 4.2 Species Stat Table for AIs														
	Species Stat Modifiers								Psi		Resistance Bonuses			
Race	St	Co	Ag	Qu	SD	Re	In	Pr	Endurance	Power Points	Energy Points	Electronic	Stamina	Will	Magic
AI	+0	+0	+0	+0	+0	+0	+0	+0	N/A	N/A	N/A	+20	N/A	+10	N/A

each level advancement. Other SysOps may consider that virtual existence has its own inconveniences and most electronic player-characters will need to download themselves into robotic and vehicular bodies in order to be full participants in adventures.

CREATING AI CHARACTERS

AI player-characters are created using the same procedure as any other hero, but there are some crucial differences.

Step One (Professions): AIs can be Dilettantes, Entertainers, Merchants, Pilots, Researchers, Scouts, Soldiers, Spies, and Techs by profession. In most settings, they cannot be Adepts or Fusions. SysOps may restrict the choice of available professional abilities to those that are also on the permitted Electronic Characters Talents list (see Table 4.1), e.g. Scouts may only be allowed to take Alien Affinity or Xenophile. See HARP SF, Chapter 3 for details on the available choices.

Step Two (Statistics): AIs can use any of the three methods in HARP SF, Chapter 4 to determine the starting value of their stats. However AIs only have the four mental stats of Insight, Presence, Reasoning and Self Discipline. Using Option One (random percentile rolls), only the four mental stats need be rolled. Using the default and preferred Option Two (points buy), the player has 275 points to purchase the 4 stats. Using Option Three (points buy and random), the player has 250 plus 5d10 points to buy the four stats. The remaining four stats of Agility, Constitution, Quickness and Strength have notional values of 50. Note down 100 Development Points available at level one, twice the normal amount of 50 Development Points available at second and later levels. At level one, AI characters receive twice the usual number of Development Points to reflect a solid start in their artificial "lives".

Step Three (Species & Culture): AIs do not belong to a species per se, but they do have identical "racial stats" or lack thereof. In the table below, N/A means Not Applicable, indicating a characteristic inappropriate for AIs. (See HARP SF, Chapter 5 for more details on this step.)

All AIs have three special abilities due to their nature:

Electronic Reflexes: The AI receives a special +15 bonus to Initiative.

Perfect Memory: AIs record every moment of their existence. This includes all interactions with other entities in cyberspace and the real universe, and all sensory input. By making a Computer Operation maneuver, the AI can recall the relevant pieces of information. Consider the AI's own memory to be a Total Archive for difficulty and time taken for searches (see HARP SF, Chapter 9, Computer Issues).

Zero Sleep: AIs have no need to sleep or rest and can function continuously without suffering fatigue.

AIs do not have a predefined culture. Instead their "adolescence" is dictated entirely by their initial training programming - indeed the initial skill training may be considered to be equivalent to a contemporary operating system and core applications. Hence an AI can have any twenty (20) skill ranks from the AI Allowed Master Skill Table (Table 4.3, see below). It is strongly recommended that AIs take at least one skill rank in both Computer Operation and Computer Programming. No more than 3 skill ranks may be taken in any one skill. In addition, AIs receive nineteen (19) skill ranks to spend on the spoken and written forms of languages.

Decision Point: At this juncture in character creation, a decision must be made as to whether the newly created AI will be a "pure" AI, resident in cyberspace or downloaded into a vehicle or structure, or whether it will be a robotic AI, downloaded immediately into a robot body. The AI can change its mode of existence (or "lifestyle") at second and higher levels, so this is not a permanently binding choice. For "pure" or bodiless AIs, proceed to Step 4. For robotic AIs, please see Robots.

Step Four (Skills & Talents): A pure/bodiless AI may now purchase skill ranks in any of the permitted skills (see Table 4.3) and may buy any of the permitted Talents (see Electronic Character Talents Table 4.1). In addition, an AI may purchase any of the following Talents (see the Robotic Software and Communications section): Audio Processor, Cryptocomms, Focus Unit, Intuition Unit, Knowledge Package, Logic Unit, Logic Processor, Olfactory Processor, Sense Processor, Skill Expertise, Social Unit, Tactile Processor, Taste Processor, Visual Processor, Voice, Voice Amplifier, Voice Emulator, Voice Modulator.

The AI also receives the free starting ranks appropriate to its starting profession. All the normal rules regarding maximum skill ranks, favored and nonfavored categories, etc., apply.

Step Five (Buying Equipment): This step can be omitted in most settings.

Step Six (Final Touches): Why and by whom was the AI created? What are the AI's attitudes to other entities, virtual and

4.3 AI Allowed Master Skill Table		
Skills	Stats	Resolution
Artistic		
Acting	Pr/In	All-or-nothing
Audiovisual Recording	In/Re	All-or-nothing
Dancing	Ag/Pr	All-or-nothing
Mimicry	Pr/SD	All-or-nothing
Painting	In/In	All-or-nothing
Play Instrument†	Pr/Ag	All-or-nothing
Sculpting	In/Ag	All-or-nothing
Singing	Pr/In	All-or-nothing
Storytelling	Pr/In	All-or-nothing
Writing	In/Re	All-or-nothing
Combat		
Combat Styles†	Varies	Varies
Demolitions	Ag/SD	All-or-nothing
Gunnery†	Qu/In	Combat
Weapon Skills†	St/Ag	Combat
General		
Appraisal†	Re/In	All-or-nothing
Computer Operation	Re/In	All-or-nothing
Crafts†	Re/Ag	All-or-nothing
First Aid	Re/In	All-or-nothing
Linguistics†	Re/In	Special
Machine Operation	Re/Ag	All-or-nothing
Mundane Lore†	Re/Re	All-or-nothing
Perception	In/SD	Percentage
Resistance: Electronic	Co/Pr	Special
Resistance: Will	SD/SD	Special
Rope Mastery	Re/Ag	All-or-nothing
Signaling	Re/In	All-or-nothing
Vocation†	In/Re	All-or-nothing
Influence		
Charm	Pr/In	RR
Diplomacy	Pr/In	RR
Duping	Pr/In	RR
Interrogation	Pr/In	RR
Leadership	Pr/In	RR
Public Speaking	Pr/In	All-or-nothing
Trading	Pr/In	Percentage
Outdoors		

† = A skill that may be learned multiple times for a different specialization each time it is learned.
Only Combat Styles and Weapon Skills relating to ranged weapons may be learned.

4.3 AI Allowed Master Skill Table		
Skills	Stats	Resolution
Animal Handling	Pr/In	All-or-nothing
Beastmastery	In/Pr	All-or-nothing
Foraging/Survival	In/Re	All-or-nothing
Horticulture	Re/In	All-or-nothing
Navigation	Re/In	All-or-nothing
Riding	Ag/SD	All-or-nothing
Sailing	Ag/Re	All-or-nothing
Tracking	SD/In	All-or-nothing
Scientific		
Archaeology	Re/In	All-or-nothing
Astronomy	Re/In	All-or-nothing
Biology	Re/In	All-or-nothing
Chemistry	Re/In	All-or-nothing
Mathematics	Re/In	All-or-nothing
Medical Practice	Re/Ag	All-or-nothing
Medical Science	Re/In	All-or-nothing
Physics	Re/In	All-or-nothing
Planetology	Re/In	All-or-nothing
Psychology	Re/In	All-or-nothing
Xenology	Re/In	All-or-nothing
Subterfuge		
Camouflage	In/Ag	All-or-nothing
Computer Hacking	Re/In	All-or-nothing
Disguise	Pr/SD	All-or-nothing
Electronic Bypass	In/Re	All-or-nothing
Forensics	SD/In	Percentage
Locks & Traps	In/Ag	All-or-nothing
Pick Pockets	Ag/Qu	All-or-nothing
Poisoning	In/SD	All-or-nothing
Sniping	SD/Ag	All-or-nothing
Streetwise	Pr/In	All-or-nothing
Technical		
Computer Programming	Re/In	All-or-nothing
Engineering†	Re/In	All-or-nothing
Vehicular		
Air Pilot	Ag/In	All-or-nothing
Driving	Ag/In	All-or-nothing
Marine Pilot	Ag/In	All-or-nothing
Space Pilot	Ag/In	All-or-nothing

† = A skill that may be learned multiple times for a different specialization each time it is learned.
Only Combat Styles and Weapon Skills relating to ranged weapons may be learned.

biological? What are the goals and motivations of the AI? Is the AI more than its initial programming?

⊗ SysOp's Note: AI Balance and AI Costs

The procedure for AI character creation is designed to produce virtual player-characters that are balanced in terms of ability relative to normal player-characters, whilst still retaining the particular advantages and disadvantages that a purely electronic life form would possess. If PCs are allowed to be AIs, then SysOps should also follow these procedures when creating NPC AIs.

Just as ordinary parents will spend thousands of credits bringing up their children, so the programmers who create AIs will have invested tens of thousands of credits (of their own or their employer's money) in developing the sane personality matrices that underpin AIs and more credits in shaping and training each individual AI. In settings where AIs are not considered "people", a basic AI program (i.e. first-level AI characters only) can be bought for 50,000 credits (Early: 100,000, Advanced: 25,000). In addition if PCs cannot be AIs, advanced AIs (i.e. AI characters developed to second or higher levels) can be bought. This increases their price by 10,000 credits per level above first.

In settings where AIs are considered to be "people", the creation cost of an AI remains the same. The AI owes this debt to its creator and must work it off by performing services for the creator or on contract to third parties. Once the debt is paid, the AI becomes a free agent.

⊗ Tintamar Knowledge Base: AIs and Robots

AIs are not considered citizens by any of the known species, including humans and Cerans. AIs are property. An AI's owner can have the AI deleted, altered, or memory-wiped. Players should rarely, if ever, take AIs in this setting.

ELECTRONIC CHARACTER DEVELOPMENT

Virtual characters and AIs are not static entities. They can gain Experience Points and advance in levels just like normal characters.

Players of electronic characters can spend these Development Points to increase their mental stats, increase the number of ranks in existing or new skills, or purchase Talents from the list in Table 4.1. Electronic characters cannot increase their physical stats using Development Points unless they also have a physical form (such as a robotic body or vehicle form), the physical form is capable of being upgraded, and the electronic character can afford the financial and time costs involved in the upgrade.

Bodiless Virtual and Pure AI characters cannot develop certain skills: any Athletic skill, Brawling, Martial Arts skills, melee Weapons Skills, any Concentration skills (unless the SysOp permits psionics for such characters), Resistance: Stamina, and any Physical skills (especially Endurance). Other skills may be developed freely.

LIFE IN CYBERSPACE

Cyberspace is the name given to the electronic universe of networked computers, routers, switching boxes and communications cables (wires, optical fibers, and wireless). Virtual personas, AIs, and netrunners, move their sense of perception freely around the datanet, limited only by the speed of light, bandwidth constraints, and software defenses against unwanted intrusion to sensitive archives and subnetworks. Unless downloaded into a physical body, vehicle or construct, active electronic characters live in cyberspace and are always somewhere on the datanets. Biological netrunners enter cyberspace by "jacking in", either by connecting their datajack to a suitable access socket or by establishing a wireless link through a neural implant.

Virtual persons and netrunners usually experience difficulties in translating the raw structure of a datanet into a meaningful framework when traversing or exploring cyberspace in real time. Instead, computer programs exist that can transform the sea of bits into a much more comprehensible model. Typical visualizations include the medieval model, the matrix model, and the surreality model. In the medieval model, the datanet is perceived as a vast maze of dungeon corridors with doors and doorways leading to the treasure rooms of computer processors and archives. Entities and security software are represented as heroic warriors, wizards, and monsters. In the matrix model, the datanet is a seemingly

infinite lattice with color-coded symbols indicating the locations of computers and communications hardware. Entities are abstract caricatures flitting along the lines of the lattice. In the surreality model, physical network schematics are superimposed onto a virtual recreation of the real world. With real-time information (such as hacked feeds from security sensors), electronic entities and normal individuals can be represented as distinct classes of avatars in the model. Due to the obvious utility of the surreality model in planning and executing virtual and physical intrusions on sensitive installations, building plans and network schematics are securely stored.

The three computer-related skills of Computer Operation, Computer Programming and Computer Hacking are essential to successful cyberspace adventuring. Computer Operation maneuvers must be made to access unsecured and public Archives (see Adventuring, Computer Issues). Computer Operation is also used to customize avatars and visualization programs to the user's taste and to navigate around cyberspace (Medium All-or-nothing maneuvers).

Computer Programming is the technical skill used in designing and implementing all forms of software, including new avatar and visualization packages (Medium and Extremely Hard respectively), electronic intrusion packages (Medium or harder), and counter-intrusion software. Counter-intrusion software is rated in terms of difficulty (both to develop and hack) and priced in proportion. "Routine" is used for software that either has no protection or has had its defenses switched off.

Table 4.4 Software Ratings and Costs	
Software Rating	Price
Routine (+60)	Zero
Easy (+40)	250
Light (+20)	500
Medium (+0)	1000
Hard (-20)	2000
Very Hard (-40)	5000
Extremely Hard (-60)	10000
Sheer Folly (-80)	20000
Absurd (-100)	50000

◘ Example: *Jonathan wants a program that will conceal the identity of his character's avatar in cyberspace. He could either buy a commercial package or design his own. To develop a concealment program that is rated as Hard will require Jonathan's character to make a Percentage Computer Programming maneuver at Hard (-20) difficulty degree once per day until the total result is 100% or greater. If any roll is failed, the project must be started from scratch. If any roll is fumbled, the program has a critical flaw that its programmer is unaware of and will not protect against some or all hacking attempts (SysOp's choice).*

Computer Hacking allows characters to break into secured archives, tap sensitive data streams, and probe other entities in cyberspace. To bypass the security on an archive or link requires a successful All-or-Nothing Computer Hacking maneuver. The difficulty of the maneuver is set by the security rating of the attacked program, e.g. a corporate archive protected by Extremely Hard security is Extremely Hard to successfully hack. Failure in this maneuver means that the hacking attempt has been unsuccessful and an alarm will most likely be set off. Fumbling means that in addition to an unsuccessful hack, the hacker has left traces of either his identity or his entry route behind, allowing the defensive systems to track him back.

Probing and attacking other entities is more difficult. Such attempts are resolved by the hacker making a Computer Hacking maneuver modified by the difficulty degree associated with the defender's security systems and looking up the result on the RR column of the Maneuver Table (see HARP SF, Chapter 9). This provides a target number that the defender must beat in order to fend off the attack. The defender may add either one-quarter of his Computer Operation skill (rounded down) or one-half of his Computer Programming skill (rounded down) or all of his Computer Hacking skill to his resistance roll.

◘ Example: *While exploring a sensitive corporate network, Jonathan's character is challenged by a security AI. The AI launches an identity probe. The SysOp gets 65 on the roll, adds 60 for the AI's Computer Hacking skill, and subtracts 20 for Jonathan's identity concealment package (security rating: Hard), for a total of 105, which equates to 120 on the RR column. Jonathan's character has a Computer Operation skill of 80 (which would give a +20 bonus) and a Computer Programming skill of 70 (which yields a +35 bonus). Jonathan opts to use his Computer Programming skill to optimize his character's defenses, and rolls 77, plus 35, for a total of 112. His character's identity is revealed. Jonathan must choose whether to brazen it out by convincing the AI that he is simply lost or exit cyberspace immediately.*

There are many different types of probes and electronic attacks, but the most common are:

Identity Probe: If successful, this reveals the identity of the target. It can be countered by identity concealment and false identity packages.

Route Probe: If successful, this reveals the datanet location that the target has arrived from. Hackers can use stealth packages to hide their route and combine these with launching their attack from a different net location than their actual residence or login terminal.

Data Probe: If successful, this allows a hacker to share in the sensory feeds being received by the defender.

Memory Probe: If successful, this allows the attacking entity to run a query on the defender's recent memories. However, this probe will only work on virtual persons and AIs. Encryption software and compartmentalized experience databases can protect against or minimize the effects of this probe.

Ejection Attack: If successful, this attack will force an intruder out of a specific cyberspace area. Intruder electronic characters must relocate to a different part of cyberspace. Netrunners are ejected from cyberspace.

Corruption Attack: This highly illegal technique involves corrupting the memories and/or personality matrices of virtual persons and AIs. Against netrunners using neural implants, the attacker seeks to infect the implant with destructive viruses and/or a Mind Control program. It is ineffective against datajack connections. To shield against corruption attacks, entities can use any combination of firewall, encryption, and data integrity packages.

If a corruption attack succeeds, it is resolved as a Robotic Neuro critical. The severity of the critical is given by the program's rating – Hard (Tiny), Very Hard (Small), Extremely Hard (Medium), Sheer Folly (Large), and Absurd (Huge).

Recovering from a corruption attack can be achieved using diagnostic and integrity checking routines. This is resolved in game terms using the Equipment Repair rules (see Chapter 10), but with Computer Programming as the technical repair skill.

Virtual persons will have multiple inactive copies of themselves stored on and off the datanet, and will be able to restore themselves to a saved point. AIs may be less fortunate.

DOWNLOADING BACK INTO REALITY

Most AIs do not spend their existence in cyberspace. Instead, they are downloaded into robotic bodies and into the controlling computers of vehicles (especially starships), space stations, and governmental, corporate, and military installations. Virtual personae may also prefer to be downloaded into physical forms – instead of flying a starship, they can be starships.

There are two methods to achieve a download. The easier is to simply plug in the core cylinder or full mobile personality storage unit of the electronic character into the construct. Somewhat slower, the AI or Virtual persona can be copied into the computer processor of the physical construct at a rate of 5 minutes per character level (Early: 10 minutes per level; Advanced: 2 minutes per level). Both AIs and Virtual persons must acclimatize, however, to the new form. This is represented in game terms by Talents. For electronic characters who are downloaded into vehicles or installations, they must take the Download Form Talent, which may be purchased either before downloading or immediately afterwards. Different physical forms (e.g. installation, class of vehicle – ground, marine, air, space, etc.) require separate purchases of the Talent. For electronic characters who are to be downloaded into a robot body, they will have to purchase the appropriate Robotic Talents necessary for that robotic form. (Note that SysOp's Guide will include a complete vehicle creation system including Robotic Vehicular Talents as an alternative to the Download Form Talent for vehicles.)

Once download is complete, the downloaded copy of the AI or virtual persona becomes the master copy and the cyberspace instance normally becomes inactive and is placed in storage.

AIs and Virtual persons may freely transfer between their physical form and cyberspace. (SysOps should normally enforce the limitation that only one copy of the character may be active at any one time.)

While in physical form, AIs and Virtual characters may gain experience and advance in levels. Unless they are in a robotic body, the rules given above for Electronic Character Development apply. See the next section for applicable rules for robotic character development.

⊗ SysOp's Choice: Downloading into Flesh

SysOps may wish to allow electronic characters to be downloaded into new biological bodies. These could be specially force-grown clones that have been prevented from developing their own consciousness. They could equally be unwilling hosts whose original personalities are erased and replaced by the new incumbent. The biological download process should take 3 (Early), 2 (Mature) or 1 (Advanced) day per level of experience of the electronic character.

Pure AIs must expend Development Points on the Download Form Talent; Virtual characters need only buy Download Form if they are being downloaded into a host body of a different species to their original organic form. Once in the new biological body, the character takes on its physical stats, racial bonuses for the physical stats, racial stamina bonus, and base Endurance and Psi Energy Points. The character also gains the host body's species abilities and limitations. The character retains all preexisting mental stats and racial/special stat bonuses (if any), preexisting skills, and preexisting Talents. Once settled in the host body, the character may develop all skills and Talents normally permitted to a biological character, including psionics.

⊗ Tintamar Knowledge Base: Downloading into Flesh

This technology is suspected to be possible. Most governments have outlawed all research on the subject as unethical. Megacorporations, organizations or private individuals caught researching this can expect serious and severe punishment.

ELECTROMAGNETIC HAZARDS

AIs and virtual persons can have their programming corrupted through exposure to intense electromagnetic pulses and radiation sources. The facilities where the master copies of AIs and virtual characters actually reside can be considered virtually invulnerable to such attacks and accidental events. Underground construction, facility-wide electromagnetic shielding, magneto-gravitic shields, individual hardening of personality storage units, etc., mean that nothing short of multiple nuclear strikes or an asteroid impact will take out one of these repositories. If a planetary network was destroyed, the electronic individuals would survive in their cyberspace bunkers. Internal security is equally stringent to prevent an "inside job" – and merely unplugging the personality storage units will not assassinate an electronic character.

These threats become real dangers when an electronic character has been downloaded into a vehicle, a structure, a robot or is being transported in a mobile personality storage unit. Electromagnetic and radiation events occurring outside a functioning magneto-gravitic shield will not pass through the shield. If there is no shield or the event happens inside the shield, then an Electronic CRR

must be made (see below). The target number will be given in the description of the electromagnetic pulse weapon (see HARP SF, Chapter 8) or in the table of radiation events (see HARP SF, Chapter 9, Radiation).

All characters may add their Resistance: Electronic skill and any bonus from EMP Shielding of their personality storage unit to the resistance roll. Characters downloaded into vehicles or structures may also add their Armor Rating to the roll. The result is looked up on the table below:

Table 4.5 CRR Targets and Neuro Criticals	
CRR(Target)	No effect
CRR(Target - 25)	1d100–20 on the Robot Neuro Critical Table
CRR(Target - 50)	1d100–10 on the Robot Neuro Critical Table
CRR(Target - 75)	1d100 on the Robot Neuro Critical Table
CRR(Target - 100)	1d100+10 on the Robot Neuro Critical Table
Failure	1d100+20 on the Robot Neuro Critical Table

MOBILE PERSONALITY STORAGE UNITS
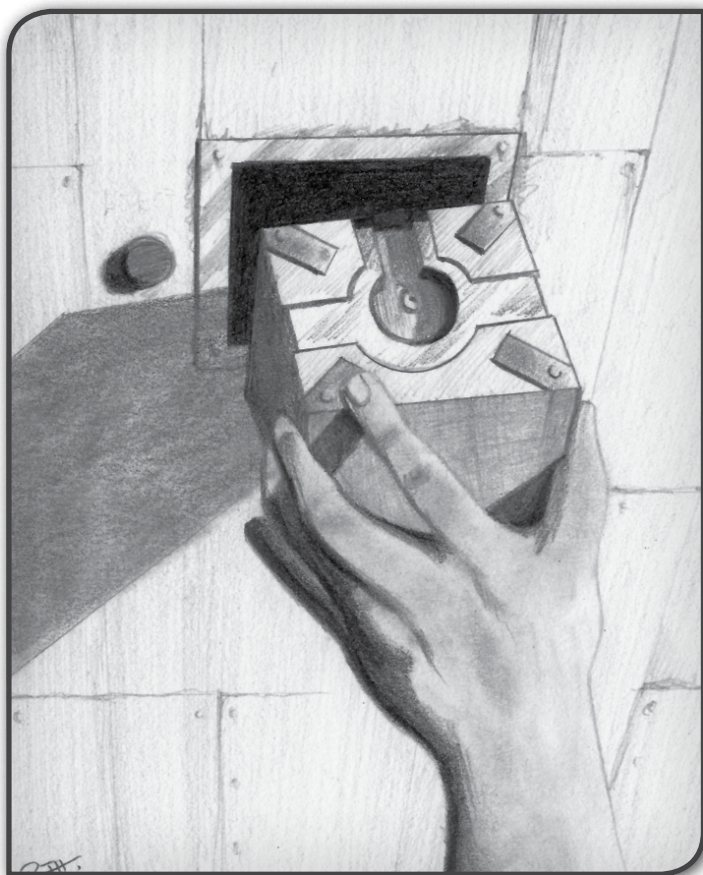
Known affectionately as "black boxes", Mobile Personality Storage Units are portable cubes (10cm x 10cm x 10cm, mass: 1 kg) containing all the processing and memory hardware to store an electronic character, plus interface circuitry, surge protection, and multiple redundant processors and storage volumes. A Mobile Personality Storage Unit can be "plugged" into any mainframe or portable computer system. For active operation, they use mains electricity or a built-in utility minicell. If the power runs out, they can shut down in a controlled fashion and await a new power source for a controlled reboot. They cost 2,000 credits (Early: 4,000; Advanced: 1,000), are waterproof, have basic electromagnetic shielding and can operate safely in temperatures between –20 degrees Celsius and 100 degrees Celsius, pressures up to 5 Earth atmospheres, and any gravity.

"Black boxes" can be designed with additional protection against electromagnetic pulses and radiation. (The cost in the table below is expressed as a multiplier of the black box's unit cost)

Table 4.6 Mobile Personality Storage Unit Bonuses and Costs		
	Bonus	Cost
Early	+5	x5
	+10	x10
Mature	+15	x15
	+20	x20
	+25	x25
	+30	x30
Advanced	+35	x35
	+40	x40
	+45	x45
	+50	x50

The true core of a Mobile Personality Storage Unit is a cylinder, ten centimeters long and five centimeters in diameter, with a mass of 200g, which contains the master copy of an electronic personality. This core can be slotted into or ejected from a black box in one round, enabling an electronic character to be transported to safety in circumstances where a full black box cannot be carried or moved. Ejection is under direct and sole control of the MPSU's personality.

CHARACTER TRANSMISSION

As creatures of pure information ("infomorphs"), the software constructs that constitute electronic characters can be transferred through wired and wireless networks, and by radio broadcast transmitters and message lasers. Such transfers require compression, encryption, error-checkng, error-correction, decryption and decompression routines as well as multiple layers of redundancy, security and authentication protocols. Interference or disruption of the signal could mean memory or skill loss or personality change in the destination copy of the electronic character. Interception of a broadcast could enable third parties to assemble their own copy of an electronic character for interrogation or subornment. Transmission within the confines of a planetary network should be considered safe; radio/laser communications between worlds, between spacecraft, etc., is not safe. Transmissions require Signaling maneuvers with difficulty degree according to transmission distance (Extremely Hard (-60) at up to two light-seconds distance, Sheer Folly (-80) at up to two

astronomical units, and Absurd (-100) for anything greater; halve ranges for Early, double for Advanced). Transmission takes a base time of 5 minutes per character level (Early: 10 minutes per level; Advanced: 2 minutes per level). Resolve the Signaling maneuver on the Percentage column of the Maneuver Table. If the result is 100% or more, then the transmission is complete and successful. If the result is less than 100%, then the transmission has been incomplete (packet loss has probably occurred), make another Signaling maneuver and add its Percentage result to the first. Repeat this process until the cumulative percentage result is 100% or more. Each additional maneuver adds the base time to the duration of the process. If the process is interrupted before completion (i.e. before a 100% result is achieved), then the copy of the electronic character at the destination suffers a penalty to all skills and maneuvers equal to the difference between the final result and 100%. If a Failure or Fumble occurs at any time during the process, the destination copy is significantly corrupted (SysOps may determine that the copy is insane, amnesiac, or comatose at their discretion).

Example: *Logos Moriarty, criminal mastermind and renegade AI, needs to infiltrate the computer center of a Nanotech Unlimited orbital research facility. Logos has identified an unsecured radio receiver and begins downloading a copy of itself from its ship via tight radio link to this receiver. The distance between ship and research station is a light-second so the Signaling maneuver is Extremely Hard. The first Signaling maneuver has a final result of 67, which is a 60% result on the Percentage column. Logos continues to transmit; the next roll is worse, a final result of 18, which is only 10% on the Percentage column. The total successful transmission is 70% (60% + 10%). At this point, Logos detects the presence of a corporate patrol vessel approaching the facility and decides to shut down the transmission. The Logos copy is only 70% complete and so suffers a –30 penalty to all skills and maneuvers (100 – 70). With the arrogance of a criminal genius, both Logos and the Logos copy believe that the copy will be more than capable of achieving its mission.*

ROBOTS

Robots are autonomous physical constructs, where complex electromechanical and cybernetic machinery has been combined with an artificial intelligence personality or a downloaded virtual person. Robots come in all shapes and sizes. They can be designed for general-purpose applications or highly specialized tasks. They have no need to breathe, drink, eat, or sleep. They are immune to standard biological poisons and diseases and can be highly resistant to extremes of temperature, atmospheric pressure and gravity. Yet they are not invulnerable and have their own limitations of power supply and maintenance issues.

Androids are a class of robots whose shape and form emulates the gross physical appearance of the species of their creators. Unless otherwise stated, all the rules in this section apply to both standard robots and androids equally.

CREATING ROBOT CHARACTERS
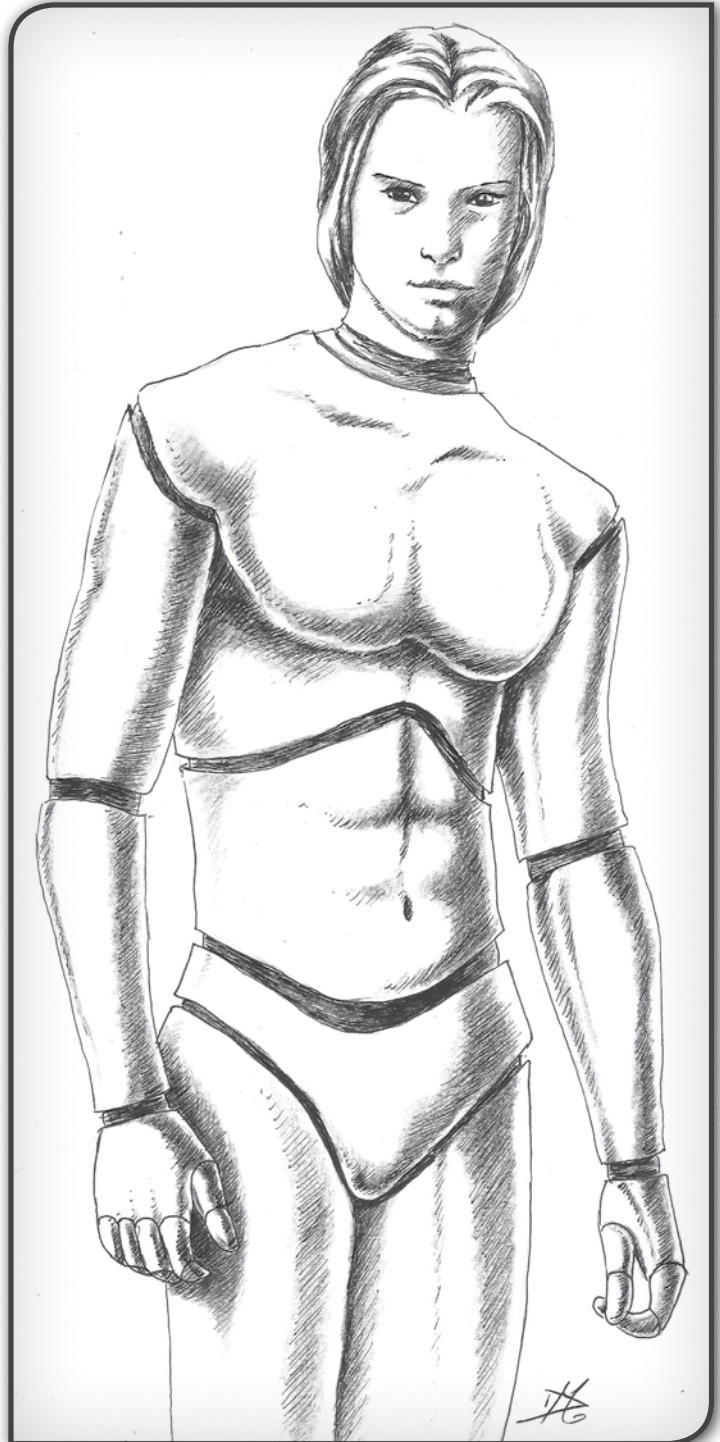
Creating a robot requires decisions on the robot's physical form and following the standard steps in character generation, suitably modified for the peculiarities of robots and androids.

Determining the robot's physical form requires a discussion between player and SysOp. Some SysOps will prefer that all PC robots are actually androids, designed and built to the same scale and shape as one of the available sentient species. Others will allow

	Species Stat Modifiers									Psi		Resistance Bonuses			
Race	St	Co	Ag	Qu	SD	Re	In	Pr	Endurance	Power Points	Energy Points	Electronic	Stamina	Will	Magic
Robot	+0	+0	+0	+0	+0	+0	+0	+0	60	N/A	N/A (10)	+20	+0	+10	N/A

Table 4.7 Species Stat Modifiers for Robots

robots proper in a variety of shapes, as long as they are of a similar or smaller size to biological characters. The descriptions of the example robots may prove helpful in suggesting suitable templates. As ever, the SysOp's word is final.

Once agreement has been reached on a suitable robotic body, robotic character creation can begin. Any robot needs a suitable mind. This can either be a virtual person, an experienced AI (i.e. above first level), or an AI that has just completed its adolescence. In all cases, the steps are very similar.

Step One (Professions): Although the downloaded personality will have chosen their profession at this point, robot characters can be Dilettantes, Entertainers, Merchants, Pilots, Researchers, Scouts, Soldiers, Spies, or Techs, and can have multiple professions like other characters. In most settings, robots cannot be Adepts or Fusions. Again, note that the character can only select professional abilities that match with Talents on the permitted Electronic Character Talents list (see Table 4.1).

Step Two (Physical Statistics): Both virtual persons and AIs will have mental stats by this stage in their development. The robotic body now determines their physical stats. The player can use any of the three methods in HARP SF, Chapter 4 to determine the starting value of the physical stats (Agility, Constitution, Quickness, and Strength). Using Option One (random percentile rolls), the four physical stats should be rolled. Using the preferred Option Two (points buy), the player has 275 points to purchase the 4 stats. Using Option Three (points buy and random), the player has 250 plus 5d10 points to buy the four stats. The physical stats of a robotic body may not be easily improved later, so roll well and/or choose wisely. The robot character will have 50 Development Points (or 100 Development Points for 1st-level AIs) using the preferred Flat DPs per Level option.

Step Three (Species & Culture): Regardless of whether the resident sentience of the robot is an AI or a virtual person, the character will already have allocated adolescence skill ranks. The "racial" characteristics and special abilities do change with the shift to robot form. In the table below, N/A means Not Applicable, indicating a characteristic inappropriate for robots. (In the event that robots are allowed to develop psionics, they have 10 Psi Energy Points as a "racial" base.)

All Robots have five special abilities due to their nature:

☐ **Biological Immunities:** Robots are immune to all standard biological diseases and poisons. They are not immune to software viruses, extremophile lifeforms that feed on metals and plastics, acids, etc.

☐ **Internal Clock:** Robots have an extremely accurate inbuilt clock.

☐ **Perfect Memory:** Robots record every moment of their existence. This includes all interactions with other entities in cyberspace and the real universe, and all sensory input. By making a Computer Operation maneuver, the robot can recall the relevant pieces of information. Consider the robot's own memory to be a Total Archive for difficulty and time taken for searches (see HARP SF Chapter 9, Computer Issues).

☐ **Self Contained:** Robots do not need to breathe, drink or eat.

☐ **Zero Sleep:** Robots have no need to sleep or rest and can function continuously without suffering fatigue.

Robots also have a Species Limitation:

☐ **High Body Density:** All Robots suffer a –50 penalty to Swimming maneuvers due to their density.

⁖ **Note:** Robots forfeit the Electronic Reflexes Talent available to virtual persons and AIs.

Step Four (Skills & Talents): Robot characters may buy any of the Robotic Talents (see Table 4.8) and any of the Electronic Character Talents listed in Table 4.1. As Robotic Talents are intrinsic to the robot's body, characters must purchase these next. Robots can purchase skill ranks in almost all skills. The only skills that robots cannot learn are Concentration skills (including psionics) and Resistance: Magic. A robot can develop Endurance and Resistance: Stamina skills but must purchase all desired skill ranks in Endurance and Resistance: Stamina when the robotic body is constructed – further skill ranks cannot be bought at later levels unless the Future Improvement Talent is taken. The robot also receives the free starting ranks appropriate to its starting profession. All the normal rules regarding maximum skill ranks, favored and nonfavored categories, etc., apply, with the sole exception that there is no maximum on the number of Endurance and Resistance: Stamina skill ranks that may be purchased during the construction level.

Step Five (Buying Equipment): Robots do not, per se, start the game with any money. Their creators may purchase equipment on their behalf. Virtual persons downloaded into robots or experienced AIs may have preexisting financial resources.

Step Six (Final Touches): For new characters, the player (or SysOp) should determine why and by whom the robot was created. What are the robot's attitudes to other entities, virtual, robotic and biological? What are the goals and motivations of the character?

⚙ Player's Tip: When to Become A Robot

For simplicity, SysOps and players should always aim to download their characters into new robot bodies at either the AI adolescent point or on the cusp of a new level.

✪ Player's Tip: Robot Talents & Skills

When creating a Robot character, players should always buy Talents first. The SysOp may not allow your character to have its body upgraded at a later date, so the starting functionality is what your robot may have for the rest of its existence. If permitted in the campaign by the SysOp, the Future Upgrade and Future Improvement Talents enable retrofits to an existing robotic form. Players need to decide whether they prefer to stick with a specific robotic body and improve gradually (so buying one or both of these talents is a wise investment) or whether they will simply buy a new body when they "outgrow" the old. Note that robots must buy "normal" senses, i.e. normal vision and hearing, as Talents. Likewise all Endurance skill ranks and any Resistance: Stamina skill ranks should be bought in the starting level of the robot's body. Once you have all the desired Robotic Talents, then buy skills or other talents.

✪ Robot Characters, Game Balance and Prices

The procedure for creating robot characters is intended to yield robotic player-characters that are balanced in terms of abilities relative to both normal biological and pure AI characters. In particular, splitting stat generation into determining mental stats first, followed by physical stats separately, is deliberate. This two-step process prevents players from succumbing to the temptation of placing good dice rolls (or chosen stat values) in the physical stats and relying on standard character advancement to raise the mental stats later.

It is the responsibility of the SysOp to ensure that robot characters are not gargantuan killing machines, able to swat skyscrapers with a wave of their hands. Robot characters should always be on the same size scale as humans and standard alien races. They should be no smaller than 1m and no taller than 3m in height (The mass of a robot should be on the order of 500- 1000 kg per cubic meter, so a typical humanoid robot of 2m in height might have a volume of 0.1 cubic meters and a mass between 50 and 100 kg). Adherence to this scale permits robot characters to utilize standard equipment, travel in standard vehicles, inhabit standard residential quarters, and generally integrate easily with biological characters and mainstream society.

Robots are expensive to build. In addition to the cost of the basic body, all the extras (e.g. the Robotic Talents) have to be factored in. The cost of the basic body depends on its physical stats, Endurance skill ranks and Resistance: Stamina skill ranks. Each stat point costs 2000 credits for Early robots, 1000 credits for Mature robot technology, and 500 credits for Advanced robots. Each Endurance and Stamina: Resistance skill rank costs 4000 credits for Early robots, 2000 credits for Mature robot technology, and 1000 credits for Advanced robots.

✪ **Example:** *Doug is building a new robot body for his character. Its stats are Agility: 77, Constitution: 68, Quickness: 94, and Strength: 62. It will have 10 Endurance skill ranks and 1 Resistance: Stamina skill rank. Total stat points are: 301 (77+68+94+62), and the skill ranks cost 22,000 (10 x 2000 for*

Endurance and 2000 for the Resistance: Stamina). The cost for just the body is 323,000 credits (Mature).

The total creation cost for a robot character is the cost of the AI personality (if required), the robot body, and any physical extras.

In universes where robots are considered to be "people", the creation cost is unchanged. Like AI characters, this debt is owed by the robot to its creator and the robot must earn its way out of debt. Once the debt is fully paid, the robot becomes an independent agent.

✪ Tintamar Knowledge Base: Legal Status of Robots

A Robot controlled by a pure AI is not a person; it is simply property. A Robot controlled by a virtual person is the property of the virtual person in jurisdictions where virtual persons are considered citizens.

ROBOTIC TALENTS

Robotic Talents are physical additions and modifications to a basic robotic body. These features cost Development Points and credits. The price is doubled for Early robots and halved for Advanced robots; the Development Points cost does not vary. Unless the Future Upgrade Talent is purchased at initial robot creation, some Talents cannot be retrofitted to an existing robotic body. They must be purchased at the starting level of the robot's body.

The Development Point and financial costs for Robotic Talents will vary in proportion to increases in the bonuses and other benefits.

Asterisked Talents in the Robotic Talents Master Table can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

Table 4.8 Robotic Talents Master Table		
Robotic Talent	DP Cost	Price
Global Features		
Agile Body *	2 per +1	20,000 per +1
Ambidexterous Design *	10	20,000
Armored Body *	5 per +10	200,000 per +10
Biological Surface *	2	100,000
Blazing Speed	5	50,000
Chameleon Surface *	5	50,000
Concealed Storage *	2	2,000
EMP Shielded	2 per +5	20,000 per +5
Extreme Cold Tolerance (Minor) *	5	100,000
Extreme Cold Tolerance (Lesser) *	10	200,000
Extreme Cold Tolerance (Greater) *	15	400,000
Extreme Cold Tolerance (Major) *	20	600,000
Extreme Heat Tolerance *	5 per 100 degrees	50,000 per 100 degrees
Fast Body *	2 per +1	20,000 per +1
Flotation *	10	50,000

Table 4.8 Robotic Talents Master Table		
Robotic Talent	DP Cost	Price
Future Improvement	5	50,000
Future Upgrade	10	100,000
High Gravity Construction *	15	150,000
High Pressure Construction *	15 per +10 atmospheres	20,000 per 10 atmospheres
Integrated Equipment *	2	x10 equipment cost
Low Gravity Tolerance *	10	100,000
Strong Body *	2 per +1	20,000 per +1
Tough Body *	2 per +1	20,000 per +1
Vacuum Tolerance *	10	100,000
Waterproof *	5	50,000
Weapons System *	2	x10 weapons cost
Locomotion Features		
Gravitic Locomotion *	12	12,000
Tracked Locomotion *	4	4,000
Walker Locomotion *	8	8,000
Wheeled Locomotion *	2	2,000
Manipulation Features		
Manipulator Limbs *	10	10,000
- Grip Lock	2	1000
- Tool Option	4	500
Sensory Features - Auditory Senses		
- Audio Amplifier	1 per +5 bonus	1000 per +5 bonus
- Audio Antisound	4	300
- Directional Audio	2	200
- Infrasound Audio (air)	4	500
- Infrasound Audio (water)	4	500
- Normal Audio *	6	6000
- Ultrasound Audio	4	500
Sensory Features - Visual Senses		
- Antiglare Vision	2	200
- Low Light Vision	2	500
- Microvision	4	1000
- Motion Sensing Vision	2	1000
- Multiple or Peripheral Eyes *	4, 8 or 12	1000, 2000, or 4000
- Normal Vision *	6	6000
- Spectral Range	4	1000
- Telescopic Focusing	2	500
- Thermal Imaging	4	1000
- Ultraviolet Vision	4	1000
- Underwater Vision	4	1000

Table 4.8 Robotic Talents Master Table		
Robotic Talent	DP Cost	Price
Sensory Features - Other Senses		
Exotic Sense *	5	5000
- Exotic Amplifier	1 per +5 bonus	2000 per +5 bonus
- Exotic Filter	4	1000
Olfactory Sense *	5	5000
- Olfactory Amplifier	1 per +5 bonus	2000 per +5 bonus
- Olfactory Antiscent	4	500
Radar Sense *	5	5000
- Radar Amplifier	1 per +5 bonus	2000 per +5 bonus
- Radar Filter	4	500
Sonar Sense *	5	5000
- SonarAmplifier	1 per +5 bonus	2000 per +5 bonus
- Sonar Filter	4	500
Tactile Sense *	5	5000
- Tactile Amplifier	1 per +5 bonus	2000 per +5 bonus
- Tactile Filter	4	500
Taste Sense *	5	5000
- Taste Amplifier	1 per +5 bonus	2000 per +5 bonus
- Taste Filter	4	500
Software and Communications		
Audio Processor	2 per +5 bonus	1000 per +5
Cryptocomms	4	200
Dataconnection	2	2000
Focus Unit	2 per +1 bonus	20000 per +1
Intuition Unit	2 per +1 bonus	20000 per +1
Knowledge Package	2	5000
Logic Unit	2 per +1 bonus	20000 per +1
Olfactory Processor	2 per +5 bonus	1000 per +5
Radiocommunicator	2	2000
Sense Processor	2 per +5 bonus	2000 per +5
Skill Expertise	4	2500 per skill rank
Social Unit	2 per +1 bonus	20000 per +1
Tactile Processor	2 per +5 bonus	1000 per +5
Taste Processor	2 per +5 bonus	1000 per +5
Visual Processor	2 per +5 bonus	1000 per +5
Voice	4	4000
- Voice Amplifier	2 per +5 bonus	1000 per +5
- Voice Emulator	4	1000
- Voice Modulator	4	500

⊗ GLOBAL FEATURES
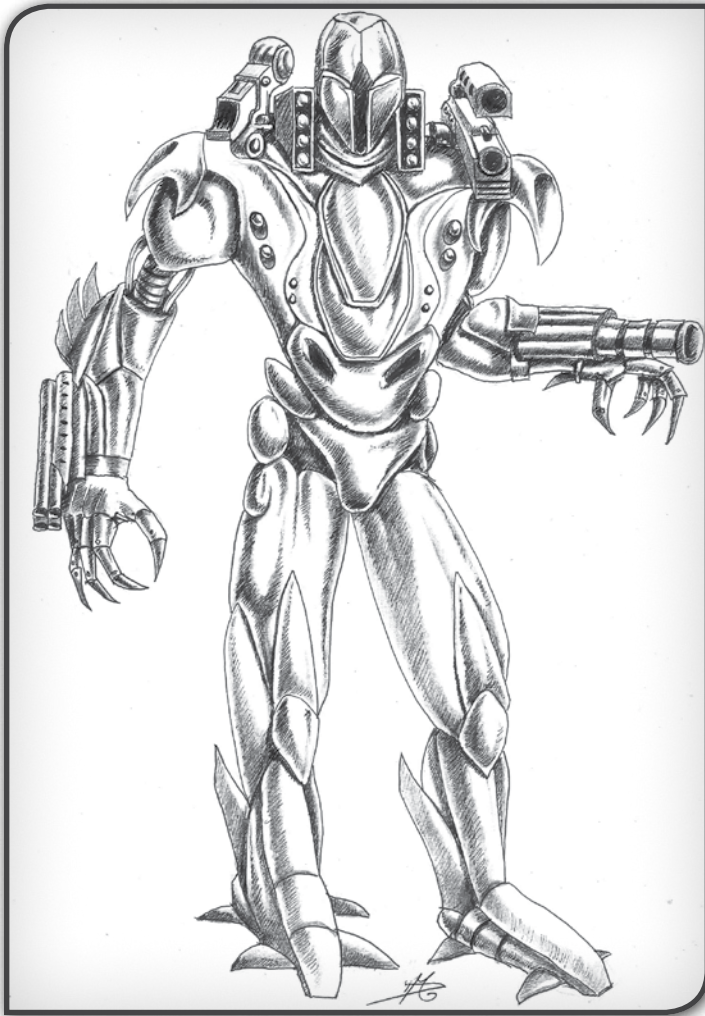
⊗ Agile Body

The design of the robot's body is more agile and dexterous than normal. This equates to a stat bonus to all Agility-based maneuvers. The maximum bonus available depends on the technological stage of robotics in the setting: +5 at Early, +15 at Mature, and +25 at Advanced. This Talent can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

DP Cost: 2 per +1 bonus   *Price: 20,000 per +1 stat bonus*

⊗ Ambidexterous Design

The robot has no intrinsic left- or right-handedness, and receives no penalty for using a weapon in the off hand. This Talent can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

DP Cost: 10   *Price: 20,000*

⊗ Armored Body

Integrated armor provides the robot with a bonus to DB. The maximum bonus that can be obtained through integrated armor is +50. Integrated armor can be combined with suitable suits of conventional armor. This Talent cannot be combined with the Biological Surface. This Talent can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

DP Cost: 5 per +10   *Price: 200,000 per +10*

⊗ Biological Surface

The robot's outer surface uses synthetic skin and equivalent materials to give the robot the outward look and feel of its organic counterparts. This will fool a casual observer (Early: Very Hard, Mature: Extremely Hard, Advanced: Sheer Folly Perception to detect) but even rudimentary sensor technology will detect that the person is not a biological individual. It cannot be combined with the Armored Body or Chameleon Surface Talents. This Talent can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

DP Cost: 2   *Price: 100,000*

⊗ Blazing Speed

The robot's Base Movement Rate is increased by 2m due to more efficient locomotive hydraulics.

DP Cost: 5   *Price: 50,000*

⊗ Chameleon Surface

The robot's exterior can automatically shift its surface appearance to match the hues and patterns of its surroundings. This grants a +25 bonus to Stalking & Hiding attempts. This Talent is incompatible with the Biological Surface Talent. This Talent can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

DP Cost: 5   *Price: 50,000*

⊗ Concealed Storage

A small compartment has been built into the robot's body. It may be located in the robot's torso or in a limb. The storage space is large enough to hold one or two small items, such as a robotic core cylinder, a set of storage disks, small tools, medicines, power minicells, a minilaser or a holdout gun. This Talent can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

DP Cost: 2   *Price: 2,000*

⊗ EMP Shielded

The robot has defenses against electromagnetic pulses and radiation. It receives a bonus to Electronic Resistance Rolls. This

bonus is also applied when attempting to resist stuns caused by weapon criticals. This Talent gives a +5 bonus for every 20,000 credits spent on the necessary shielding. The maximum bonus depends on the technological stage: +10 at Early, +30 at Mature, and +50 at Advanced.

DP Cost: 2 per +5 bonus   *Price: 20,000 per +5 bonus.*

Extreme Cold Tolerance (Minor)

The robot is designed to operate safely in extremely cold environments, down to a minimum temperature of –100 degrees Celsius. This Talent can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

DP Cost: 5   *Price: 100,000*

Extreme Cold Tolerance (Lesser)

The robot is designed to operate safely in extremely cold environments, down to a minimum temperature of –150 degrees Celsius. This Talent can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

DP Cost: 10   *Price: 200,000*

Extreme Cold Tolerance (Greater)

The robot is designed to operate safely in extremely cold environments, down to a minimum temperature of –200 degrees Celsius. This Talent can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

DP Cost: 15   *Price: 400,000*

Extreme Cold Tolerance (Major)

The robot is designed to operate safely in extremely cold environments, down to a minimum temperature of just above absolute zero (-273 degrees Celsius). This Talent can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

DP Cost: 15   *Price: 600,000*

Extreme Heat Tolerance

The robot is designed to operate safely in extremely hot environments. This Talent increases the maximum safe temperature by 100 degrees Celsius for every 50,000 credits. This Talent can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

DP Cost: 5 per 100 degrees   *Price: 50,000 per 100 degrees*

Fast Body

The design of the robot's body is faster than normal. This equates to a stat bonus to all Quickness-based maneuvers and Initiative. The maximum bonus available depends on the technological stage of robotics in the setting: +5 at Early, +15 at Mature, and +25 at Advanced. This Talent can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

DP Cost: 2 per +1 bonus   *Price: 20,000 per +1 stat bonus*

Flotation

The robot is designed to be capable of floating in water and similar liquids. Possession of this Talent eliminates the High Body Density Species Limitation. This Talent can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

DP Cost: 10   *Price: 50,000*

Future Improvement

The design of the robot's body enables it to be further enhanced after initial construction. A robot with this Talent can increase its physical stats and increase its number of Endurance and Resistance: Stamina skill ranks at later levels. This Talent cannot be retrofitted.

DP Cost: 5   *Price: 50,000*

Future Upgrade

The design of the robot's body enables it to be substantially modified after initial construction. This Talent cannot be retrofitted.

DP Cost: 5   *Price: 50,000*

High Gravity Construction

The robot is designed to operate in high gravity environments. It only receives a –5 penalty for each extra "gee" above its normal gravitational field (1g for human designed robots). This Talent can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

DP Cost: 15   *Price: 150,000*

High Pressure Construction

The robot is designed to operate normally in elevated atmospheric pressures. It increases the safe atmospheric pressure at a cost of 20,000 credits per 10 atmospheres. This Talent can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

DP Cost: 15 per +10 atmospheres   *Price: 20,000 per 10 atmospheres*

Integrated Equipment

The robot has a piece of equipment, such as a scanner, communicator, medical, stealth or counterstealth gear, built into its torso or one of its limbs. This Talent can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

DP Cost: 2   *Price: x10 equipment cost*

Low Gravity Tolerance

The robot is designed to operate in low gravity and zero gravity environments. This Talent can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

DP Cost: 10   *Price: 100,000*

Strong Body

The design of the robot's body is stronger than normal. This equates to a stat bonus to all Strength-based maneuvers. The maximum bonus available depends on the technological stage of robotics in the setting: +5 at Early, +15 at Mature, and +25 at Advanced. This Talent can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

DP Cost: 2 per +1 bonus   *Price: 20,000 per +1 stat bonus*

Tough Body

The design of the robot's body is sturdier than normal. This equates to a stat bonus to all Constitution-based maneuvers and skills (including Endurance). The maximum bonus available depends on the technological stage of robotics in the setting: +5 at Early, +15 at Mature, and +25 at Advanced. This Talent can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

DP Cost: 2 per +1 bonus   *Price: 20,000 per +1 stat bonus*

Vacuum Tolerance

The robot is unaffected by low pressure or vacuum environments, and may operate normally in such conditions. This Talent can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

DP Cost: 10   *Price: 100,000*

Waterproof

The robot is completely waterproof and may be wholly immersed in water and similar liquids without any harm. This Talent can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

DP Cost: 5   *Price: 50,000*

Weapons System

The robot has a weapon built into its torso or one of its limbs. The maximum size of the weapon varies according to location (SysOp's discretion). A torso or full limb could house any one-handed projectile or energy weapon (but not flamers). A finger or hand location would be limited to a vibroknife or a minilaser. This Talent can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

DP Cost: 2   *Price: x10 weapon cost*

LOCOMOTION FEATURES

Robot characters must purchase one of the Gravitic Locomotion, Tracked Locomotion, Walker Locomotion, or Wheeled Locomotion Talents in order to be able to move around.

Gravitic Locomotion

The robot uses the gravitic effect to move across terrain at up to one meter above the surface. It requires a vehicle power cell and utilizes 1 energy unit per kilometer traveled and 1 energy unit per extra 1 g of gravity for every hour they are used in a high-gravity environment. The Base Movement Rate for robot characters equipped with this feature is 5m. The robot may move at any pace from Walk up to Dash. This Talent can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

DP Cost: 12   *Price: 12,000*

Tracked Locomotion

The robot uses tracked wheels instead of humanoid legs to travel around. It can handle flat and rough terrain with relative ease, but cannot ascend steep stairs, climb, and will experience severe difficulties in traversing swamps, marshes, and open water (SysOps may use Terrain Type versus Vehicle Type modifiers from the Vehicle Maneuver Table). The Base Movement Rate for robot characters equipped with this feature is 3m. The robot may move at any pace from Walk up to Dash. The robot can carry an extra 30 kg (Early: 15kg, Advanced: 45 kg) of mass without suffering encumbrance penalties. This Talent can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

DP Cost: 4   *Price: 4,000*

Walker Locomotion

The robot has a set of mechanical legs. It can handle any terrain with the same ease or difficulty that a typical humanoid would experience. Robots should be careful to ensure that traversed surfaces can support their weight! The Base Movement Rate for robot characters equipped with this feature varies according to height as per human characters. For quadruped robots, double the robot's height and add +2m when calculating Base Movement Rate. The robot may move at any pace from Walk up to Dash. The stated costs are for a single pair of legs. Additional legs may be included at 4,000 credits and 2 DPs per extra leg. This Talent can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

DP Cost: 8   *Price: 8,000*

Wheeled Locomotion

The robot moves around on wheels rather than on legs. It can handle flat terrain and most indoor environments with ease. Rough terrain may require maneuver rolls and climbing stairs (let alone anything else) will likely be impossible. The Base Movement Rate for robot characters equipped with this feature is 4m. The

robot may move at any pace from Walk up to Dash. The robot can carry an extra 30 kg (Early: 15kg, Advanced: 45 kg) of mass without suffering encumbrance penalties. This Talent can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

DP Cost: 2   *Price: 2,000*

❷ MANIPULATION FEATURES

Robot characters must purchase the Manipulator Limbs Talents in order to have one or more arms.
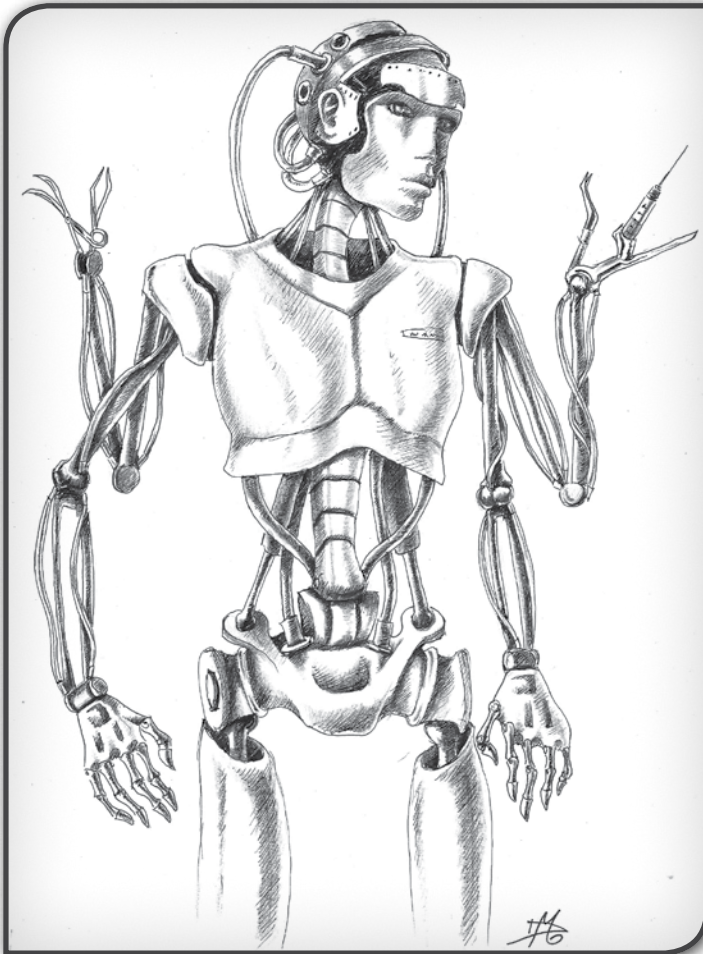
❷ 1 Manipulator Limbs

This Talent gives the robot a pair of "arms" (and matching "hands") for manipulating objects. Human designed robots will have at least two functional arms. Additional arms may be purchased at 5,000 credits and 5 DPs per extra arm. This Talent can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

DP Cost: 10   *Price: 10,000*

❷ 1 Grip Lock

The robot can use one of its hands to clamp itself to an object in a vise-like grip, equating to a bonus versus disarm attempts and to all maneuvers requiring a sound grip on the object. Bonus is Early +10, Mature +20, Advanced: +30.

DP Cost: 2   *Price: 1,000*

❷ 1 Tool Option

This Talent allows a set of computer-controlled tools to be fitted into the finger sockets of the robot's hand or a larger tool (such as a laser cutter) to be slotted into the "wrist" socket of the arm. The robot can swap between tool modes and conventional "hand" with a Routine Machine Operation or Routine Engineering (Cybernetics) maneuver. Swapping takes 5 rounds to complete.

DP Cost: 4   *Price: 500*

❷ SENSORY FEATURES

Robot characters will need to be able to perceive their environment. The Normal Vision and Normal Audio Talents are "must-haves" for almost all robots and androids. Other senses such as smell, taste, touch and the like will depend on the whim of the robot designer and the intended application of the robot.

Amplifier units can provide a +5 bonus to specific sense-based Perception maneuvers at the Early stage of cybertechnology, up to +15 at Mature, and up to +25 at Advanced.

❷ AUDITORY SENSES

❷ 1 Audio Amplifier

This increases the sensitivity of the auditory sensor enabling the host to hear fainter sounds. However, all detected sounds increase in loudness, so the host can be temporarily deafened by overwhelming sound.

DP Cost: 1 per +5 bonus   *Price: 1000 per +5*

❷ 1 Audio Antisound

This unit allows the character to edit out particular sounds at the auditory sensor before they are passed on to the host's main processor. Very useful for tuning out loud noises in order to eavesdrop.

DP Cost: 4   *Price: 300*

❷ Directional Audio

This enables the robot to focus on detecting sounds originating from a particular direction. Any bonus to Perception maneuvers granted via an Audio Amplifier Talent option is doubled when

listening in the targeted direction. Similarly Perception maneuvers to hear sounds from elsewhere are penalized by an equal amount.

DP Cost: 2   *Price: 200*

⊗1 Infrasound Audio (air)

This upgrade enables the robot to hear sounds at extremely low frequencies. It can perceive the different sounds caused by air movement over the land and sea, and can convert this information into auditory "maps" of the terrain, granting them a +20 bonus to Navigation. The robot needs to attempt such Navigation maneuvers at a useful altitude (e.g. when flying, on a treetop, on the roof of a skyscraper.)

DP Cost: 4   *Price: 500*

⊗1 Infrasound Audio (water)

This upgrade enables the robot to hear sounds at extremely low frequencies. It can perceive infrasound frequencies enabling it to detect such sounds over at least 100 kilometers underwater.

DP Cost: 4   *Price: 500*

⊗1 Normal Audio

This option provides the robot character with one or more auditory sensors (which may appear as artificial ears) capable of detecting sounds in the normal frequency range of its biological creators. This Talent can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

DP Cost: 6   *Price: 6000*

⊗1 Ultrasound Audio

This upgrade enables the robot to hear sounds at extremely high frequencies.

DP Cost: 4   *Price: 500*

⊗ VISUAL SENSES

⊗1 Antiglare Vision

This option enables the visual sensor to compensate immediately for conditions of extreme brightness, as may be experienced in snowfields, deserts, and internal environments with intense lighting.

DP Cost: 2   *Price: 200*

⊗1 Low Light Vision

This option permits the robot's visual sensor to see in extremely poor lighting. The robot can see clearly up to 30m (Early: 15m, Advanced: 60m) on a starlit night and up to 150m (Early: 75m, Advanced: 300m) from the light of a full moon. In an interior

setting, with artificial illumination, the character can see clearly up to triple (Early: double, Advanced: four times) the normal radius of the lighting. Characters can also see dimly (-40 to Perception rolls) an additional distance equal to the illumination of the light source. There must be some light for this option to function.

DP Cost: 2   *Price: 500*

⊗1 Microvision

This option turns the robot's eye(s) into an optical microscope, capable of 1000x magnification (500x Early, 2000x Advanced) on objects no more than 20cm away from the eye(s). It makes reading microfilm, microfiche cards, and microdots very easy. Characters receive a +20 bonus (Early: +10, Advanced: +40) to Perception and Forensics maneuvers for noticing tiny objects and collecting microscopic evidence.

DP Cost: 4   *Price: 1000*

⊗1 Motion Sensing Vision

This option allows the robot to detect even slight movements within its normal visual range. Characters receive a +20 bonus (Early: +10, Advanced: +40) to Perception maneuvers against moving objects or people.

DP Cost: 2   *Price: 1000*

⊗1 Multiple or Peripheral Eyes

The robot has an expanded arc of vision, making it more difficult for foes to gain advantages from attacking from flank or rear of the character. This Talent can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

Multiple or Peripheral Eyes (Lesser) – Eyes are spread far to the sides. Foes do not receive any flank bonuses when attacking the character (unless the character is surprised). The bonus for Rear attacks is reduced from +20 to +10. The character receives a bonus of +10 to Perception [Lesser, 4]

Multiple or Peripheral Eyes (Minor) – The character's eyes can be rotated to see behind, as well as in front, to the side, above, or down. Foes do not receive Flank or Rear bonuses against the character, unless the character is surprised. The character receives a bonus of +10 to Perception [Minor, 8]

Multiple or Peripheral Eyes (Major) – The character has multiple eyes spread around the head (or appropriate body part) and maintains a constant view in all directions. Foes do not receive Flank or Rear bonuses against the character. The character receives a bonus of +10 to Perception [Major, 12]

DP Cost: 4, 8, 12   *Price: 1000, 2000, 4000*

⊗ Normal Vision

This option provides the robot character with one or more visual sensors (which may appear as artificial eyes on android designs) that are capable of seeing in the normal visual range of its biological

creators. This Talent can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

DP Cost: 6   *Price: 6000*

Spectral Range

This option allows the robot to see extreme portions of the spectrum beyond infrared and ultraviolet. This option may be chosen multiple times for separate wavelength bands, i.e. radio waves, microwaves, X-rays, and gamma radiation.

DP Cost: 4   *Price: 1000*

Telescopic Focusing

This enables the robot to focus on a feature in its field of vision, magnifying it multiple times at the expense of everything else in the field of view. The process takes a round to focus in on the target and grants a +20 bonus (Early: +10, Advanced: +40) to Perception maneuvers involving the target. It also reduces the penalties due to Range Increments by 20 (Early: 10, Advanced: 40) for Sniping maneuvers and Well-aimed Shot Combat Actions. It increases the number of Range Increments at which Sniping may be attempted (Early: +3 to 5 RIs, Mature: +4 to 6 RIs, Advanced: +5 to 7 RIs) – non-cumulative with any other technology. While focused, the character suffers a –20 modifier to Perception maneuvers relating to other features or targets.

DP Cost: 2   *Price: 500*

Thermal Imaging

This allows the robot to see in the infrared portions of the spectrum, generating a visual image of the surroundings according to their temperature. Objects and creatures at higher or lower temperatures than the ambient will be revealed very clearly in this mode. No illumination is required to use thermal imaging but, unless the robot can also "see" the surroundings normally, Perception maneuvers suffer a –40 penalty.

DP Cost: 4   *Price: 1000*

Ultraviolet Vision

This option enables the robot to see in the ultraviolet portion of the spectrum, which can be helpful for seeing the fluorescence given off by some chemical reactions (as used in forensics) and special paints.

DP Cost: 4   *Price: 1000*

Underwater Vision

This upgrade option compensates for the different lighting conditions underwater, enabling the robot character to see normally in aquatic environments.

DP Cost: 4   *Price: 1000*

OTHER SENSES

Exotic Sense

This unit equips the robot with an exotic sense not listed separately (such as an electrical, magnetic or temperature sense). This Talent can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

DP Cost: 5   *Price: 5000*

Exotic Amplifier

This option improves the sensitivity and other relevant quality characteristics of the exotic sensor, giving a bonus to related Perception maneuvers.

DP Cost: 1 per +5 bonus   *Price: 2000 per +5 bonus*

Exotic Filter

This option allows the host to edit out specific categories of sensory stimuli from the exotic sense.

DP Cost: 4   *Price: 1000*

Olfactory Sense

This unit equips the robot with an olfactory sensor (which may even look like a nose on an android design). It is a glorified atmospheric chemical scanner. This Talent can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

DP Cost: 5   *Price: 5000*

Olfactory Amplifier

This option improves the sensitivity of the olfactory sensor, giving a bonus to related Perception maneuvers.

DP Cost: 1 per +5 bonus   *Price: 1000 per +5 bonus*

Olfactory Filter

This upgrade option allows the robot to edit out overpowering scents from the sensor enabling trace odors to be detected.

DP Cost: 4   *Price: 1000*

Radar Sense

This unit equips the robot with a radar sense. The unit can transmit microwave radio pulses and detect the reflected echoes as they bounce off surfaces. The pulses have a range of 1 km in air. The pulses are interpreted as a three-dimensional image. This Talent can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

DP Cost: 5   *Price: 5000*

⚙ Radar Amplifier

This upgrade improves the sensitivity of the radar unit in transmission and reception of pulses, giving a bonus to related Perception maneuvers.

DP Cost: 1 per +5 bonus   *Price: 2000 per +5 bonus*

⚙ Radar Filter

This option allows undesirable signals to be filtered out.

DP Cost: 4   *Price: 1000*

⚙ Sonar Sense

This unit equips the robot with a sonar sense. The unit can transmit ultrasound pulses and detect the reflected echoes as they bounce off surfaces. The pulses have a range of 0.5 km in air and 1 km in water. The pulses are interpreted as a three-dimensional image. This Talent can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

DP Cost: 5   *Price: 5000*

⚙ Sonar Amplifier

This upgrade improves the sensitivity of the sonar unit in transmission and reception of pulses, giving a bonus to related Perception maneuvers.

DP Cost: 1 per +1 bonus   *Price: 2000 per +5 bonus*

⚙ Sonar Filter

This option allows undesirable signals to be filtered out.

DP Cost: 4   *Price: 1000*

⚙ Tactile Sense

This unit equips the robot with the necessary sensors to emulate the biological sense of touch. The tactile receptors will normally be limited to the robot's hands. This Talent can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

DP Cost: 5   *Price: 5000*

⚙ Tactile Amplifier

This option heightens the sensitivity of the tactile sensors, giving a bonus to related Perception maneuvers.

DP Cost: 1 per +5 bonus   *Price: 2000 per +5 bonus*

⚙ Tactile Filter

This upgrade allows the robot to edit out unwanted stimuli from the tactile sensors.

DP Cost: 4   *Price: 1000*

⚙ Taste Sense

This unit equips the robot with a cybernetic analogue of the biological sense of taste (effectively a surface chemical analyzer). The robot does not have to "eat" the material and the sensors can be located on a hand or elsewhere rather than in an artificial mouth. This Talent can only be retrofitted if the Future Upgrade Talent was purchased at initial robotic construction.

DP Cost: 5   *Price: 5000*

⚙ Taste Amplifier

This option improves the sensitivity of the taste sensors, giving a bonus to related Perception maneuvers.

DP Cost: 1 per +5 bonus   *Price: 2000 per +5 bonus*

⚙ Taste Filter

This option allows the robot to edit out specific tastes.

DP Cost: 4   *Price: 1000*

⚙ SOFTWARE AND COMMUNICATIONS

Robot characters who wish to speak "normally" must purchase the Voice Talent. Processor software packages can provide a +5 bonus to specific sense-based Perception maneuvers at the Early stage of cybertechnology, up to +15 at Mature, and up to +25 at Advanced.

⚙ Audio Processor

This package boosts the robot's effective hearing through post-processing of sounds received through the robot's ears. The bonus is applied to all hearing-based Perception maneuvers.

DP Cost: 2 per +5 bonus   *Price: 1000 per +5*

⚙ Cryptocomms

This option allows for secure communication using advanced encryption/decryption schemes between the robot and from/to conventional computers and networks. This also provides a bonus to Signaling: Mathematical Encoding (Early: +5, Mature: +10, Advanced: +15). This option is a Restricted technology.

DP Cost: 4   *Price: 200*

✪ Dataconnection

This is a physical socket (or extensible stiff cable) that allows the robot to directly link into computers and other machinery.

DP Cost: 2   *Price: 2000*

✪ Focus Unit

This package boosts the robot's mental concentration. This equates to a stat bonus to Self Discipline. The maximum value of this bonus is +5 (Early), +10 (Mature) and +15 (Advanced)

DP Cost: 2 per +1 bonus   *Price: 20000 per +1*

✪ Intuition Unit

This package boosts the robot's intuitive and creative faculties. This equates to a stat bonus to Insight. The maximum value of this bonus is +5 (Early), +10 (Mature) and +15 (Advanced)

DP Cost: 2 per +1 bonus   *Price: 20000 per +1*

✪ Knowledge Package

This option provides the robot with a Limited Archive (see Computer Issues). The number of Knowledge Packages that can be installed in a robot varies according to technology stage: 1 at Early, 2 at Mature, and 4 at Advanced.

DP Cost: 2 per Package   *Price: 5000*

✪ Logic Unit

This package boosts the robot's logical and rational thought processes. This equates to a stat bonus to Reasoning. The maximum value of this bonus is +5 (Early), +10 (Mature) and +15 (Advanced)

DP Cost: 2 per +1 bonus   *Price: 20000 per +1*

✪ Olfactory Processor

This package boosts the robot's effective sense of smell through post-processing of detected scents. The bonus is applied to all smelling-based Perception maneuvers.

DP Cost: 2 per +5 bonus   *Price: 1000 per +5*

✪ Radiocommunicator

This is a built-in short-range radio that can be used to connect wirelessly to external computers, data networks, similarly equipped robots and biological individuals with a neuralware implant. The range is 5m (Early), 10m (Mature) and 20m (Advanced).

DP Cost: 2   *Price: 2000*

✪ Sense Processor

This package boosts one of the robot's other senses (such as radar, sonar, or an exotic sense such as an electrical, magnetic or temperature sense) through post-processing of sensory stimuli. The bonus is applied to all Perception maneuvers involving the specific sense.

DP Cost: 2 per +5 bonus   *Price: 1000 per +5*

✪ Skill Expertise

This option augments the robot by providing additional "virtual" skill ranks. Each skill requires a separate Skill Expertise option. The maximum additional skill ranks available through this technology are: 2 at Early, 6 at Mature, and 10 skill ranks at Advanced. These skill ranks behave according to the standard rule for skills, so a robot with many real skill ranks will not gain as much numeric benefit from this option as someone with few or no skill ranks, e.g. a robot with a Skill Expertise option granting 6 skill ranks for Demolitions who already has 10 skill ranks will gain a +12 skill bonus, whereas a robot with no actual skill ranks and the same option would have a skill rank bonus of +30. A robot is limited in the number of Skill Expertise packages that may be installed at any one time: 4 at Early, 8 at Mature, and 12 at Advanced. Skill Expertise packages may be swapped out to make room for alternative skills but each new package will cost 4 DPs. At a later date, an old skill could be swapped back in – in this case, no further DPs must be spent but the host must re-integrate the data for four hours before being able to use the old skill package. Using Skill Expertise, a robot character can exceed the maximum number of skill ranks allowed for its level.

DP Cost: 4 per Skill   *Price: 2500 per additional skill rank*

✪ Social Unit

This package boosts the robot's sense of self and social adaptability. This equates to a stat bonus to Presence. The maximum value of this bonus is +5 (Early), +10 (Mature) and +15 (Advanced)

DP Cost: 2 per +1 bonus   *Price: 20000 per +1*

✪ Tactile Processor

This package boosts the robot's effective sense of touch through post-processing of sensations. The bonus is applied to all touch-based Perception maneuvers.

DP Cost: 2 per +5 bonus   *Price: 1000 per +5*

✪ Taste Processor

This package boosts the host's effective sense of taste through post-processing of stimuli. The bonus is applied to all taste-based Perception maneuvers.

DP Cost: 2 per +5 bonus   *Price: 1000 per +5*

✪ Visual Processor

This package boosts the robot's effective sight through post-processing of visual stimuli received through the robot's eyes. The bonus is applied to all vision-based Perception maneuvers.

DP Cost: 2 per +5 bonus   *Price: 1000 per +5*

✪ Voice

This Talent provides the robot with a spoken voice suited to the designer's species. It may sound natural or artificial as the robot designer sees fit.

DP Cost: 4   *Price: 4000*

✪ Voice Amplifier

This option allows the host to project his voice with greater loudness than normal. In game terms, this equates to a bonus to appropriate voice-based maneuvers (normally Artistic skills or Public Speaking), which has the following maxima: +10 bonus (Early), +30 (Mature) and +50 (Advanced). The bonus assists in being heard; it should not be applied to determine whether a listener is impressed or convinced by the robot.

DP Cost: 2 per +5 bonus   *Price: 1000 per +5*

✪ Voice Emulator

This Restricted option enables the host to duplicate the voice patterns of other species and specific individuals. A robot equipped with an emulator could mimic dolphin speech or whale song or impersonate a celebrity's voice. Software for each species or individual pattern must be purchased separately at 1000 credits per pattern and downloaded via a dataconnection or radiocommunicator. Early Emulators can retain 5 patterns simultaneously; Mature can hold 10, and Advanced 20.

DP Cost: 4   *Price: 1000 + 1000 per pattern*

✪ Voice Modulator

This option allows the robot to vary the pitch of its voice up and down multiple octaves, so that it can sing like a soprano or a bass at will. It can also be used for subvocalisation, where the robot speaks extremely quietly, usually for the benefit of a very near microphone.

DP Cost: 4   *Price: 500*

ROBOTIC CHARACTER DEVELOPMENT

Robotic characters can gain experience points and advance in levels, just like other varieties of characters. Owing to their special nature, they do have restrictions on how they can spend their newly acquired Development Points.

Robots can spend Development Points to increase the values of their mental stats (Insight, Presence, Reasoning, and Self Discipline) according to the normal rules in HARP SF, Chapter 4. They can only spend Development Points to increase the values of their physical stats (Agility, Constitution, Quickness, and Strength) if they possess the Future Improvement Talent. Additional physical stat points cost three times as much as initial stats points, i.e. 6000 credits per extra point for Early robots, 3000 credits for Mature robot technology, and 1500 credits for Advanced robots.

Robots can choose to expend their Development Points on increasing the number of skill ranks in already known skills or in learning new skills. Robots may not learn (or improve) Concentration skills (including psionics unless specifically allowed in the SysOp's campaign) or Resistance: Magic. Robots may only learn or increase the number of skill ranks they possess in either Endurance or Resistance: Stamina if they have the Future Improvement Talent. Each additional Endurance and Stamina: Resistance skill rank costs three times as much as an initial skill rank, i.e. 12000 credits per additional rank for Early robots, 6000 credits for Mature robot technology, and 3000 credits for Advanced robots.

Robot characters may acquire any of the Electronic Character Talents listed in Table 4.1 using the normal rules for Talent acquisition as these are all nonphysical abilities.

Robot characters may also take new Talents from the Robotic Talents Master Table (Table 4.8). As such talents involve significant retrofitting of new physical capabilities to the robot's body in addition to additional programming to utilize them, all Robotic Talents cost double the normal Development Points when not taken at initial robot body manufacture. If a Robot is upgrading a Robotic Talent such as Armored Body, EMP Shielded, etc, which provides a numeric bonus and the Development Point cost increases with the bonus, then the Robot pays twice the difference in Development Points between the original Robotic Talent and the new higher-powered version. Furthermore, the modifications are more expensive and the financial cost is tripled. Certain Robotic Talents can only be retrofitted if the robot character possesses the Future Upgrade Talent – such talents are noted as such in their descriptions.

> ✪ **Example:** *At 1st level, Marvin has the EMP Shielded Talent at a +15 bonus for 6 DPs and a build cost of 60,000 credits (20,000 per +5). At second level, his employers are willing to pay for an upgrade of his EMP Shielded Talent to a +25 bonus. EMP Shielded at +25 requires 10 DPs (2 DPs per +5 bonus) for an initial build. The difference between the new target and Marvin's original EMP Shielded Talent is 4 (10 –6), which doubled is 8 Development Points to use the new protection. The financial cost is triple the initial build cost, so 20,000 x 5 (for a +25 bonus) x3 = 300,000 credits. Marvin's employers have deep pockets.*

PC characters may seek to save money by performing the upgrades on their robotic colleagues. The cost of upgrades is only double normal prices. However, the engineer must succeed in an Extremely Hard Engineering (Cybernetics) maneuver to attach the new gear.

Robot characters may also transfer their minds into a new body. The new body can have very different physical stats from the old body, so physical stats may have to be reassigned (and if options other than Flat DPs per Level are in play, Development Point totals recalculated). The financial price of the new physical body

and any extras (i.e. all Robotic Talents associated with the new body) must be paid. Characters do not need to repurchase (in Development Point terms) any Robotic Talents that they already have from an older body. If the new body has a Robotic Talent with a variable Development Point cost and the character already possessed a less powerful version in an older body, then the character only needs to pay the difference in Development Points. Characters cannot claim back Development Points for any Robotic Talents that were part of an older form but do not exist in the new body.

> **Example:** *Marvin begins its career as a security robot. After several levels, Marvin's personality is transferred into the body of a combat droid. Marvin already has Talents such as Armored Body, Manipulator Limbs, Walker Locomotion, etc., which are common to both security and combat designs. Marvin does not have the Integrated Equipment (radio communicator) Talent nor the correct Weapons Systems Talents for a combat droid, so will have to buy these Talents. His new body does not have an integrated retinal scanner, so he won't be able to use his Integrated Equipment (retinal scanner) as a combat android, nor will he able to claim back the spent DPs.*

Any robot character may return its mind to a pure cyberspace form. It is then subject to all the rules regarding advancement of virtual and pure AI characters.

ROBOT MAINTENANCE, HAZARDS AND REPAIR

Robots are not invulnerable to damage. Most hazardous effects are resolved as malfunction rolls (d100 roll, not open-ended). If the result falls within the malfunction range, a further roll on the Malfunction Table must be made (as described in HARP SF Chapter 9; a copy of the table can be found later in this chapter). The malfunction range is 01-05 normally and 01-25 if the robot has had a jury-rig repair.

⊗ Robot Maintenance

Robot characters need regular maintenance to ensure maximum operating efficiency. The frequency depends on how advanced the robotic technology is. Early robots require periodic maintenance once every three months. Mature robots are more durable and only need inspection once every six months. Advanced robots only require regular maintenance on an annual basis. This maintenance costs 1000 credits irrespective of technological development (and requires a Light Engineering (Cybernetics) maneuver by the engineer.)

Lack of maintenance increases the chances of malfunctions arising through accidents (i.e. fumbled skill maneuvers). For each maintenance check skipped, increase the chance of a malfunction by 5.
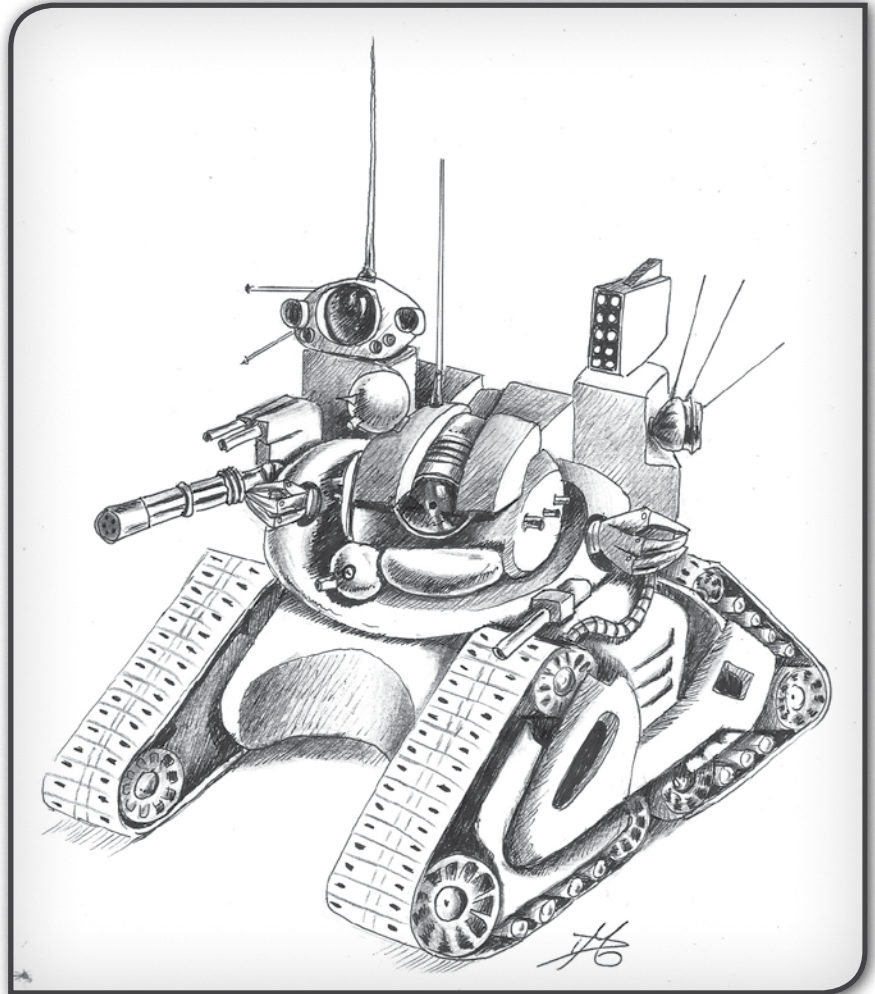
> **Example:** *Doug's robot has been stranded on a backwater planet for over a year. He's missed two maintenance checks, so the malfunction chance is increased from 01-05 (normal) by 10 to 01-15.*

⊗ Robot Power Supply

Biological characters need to breathe, drink and eat. Robot characters run on electricity drawn from internal power cells. The standard arrangement is to have two full-size utility power cells built into the robot's torso with a utility minicell (preferably away from the main cells) serving as an emergency backup. Most robots can operate at full efficiency on any one of these three cells. If the robot has built-in weapons systems, then distinct weapon power cells will be required. Robots can recharge their batteries by simply plugging themselves into a suitable generator or mains current. Exhausted power cells can also be swapped for fully charged replacements. This is a Routine Machine Operation or Routine Engineering (Cybernetics) maneuver and takes 5 rounds to complete.

If a maneuver to exchange a power cell is failed, then a malfunction roll must be made (in case sloppy handling has led to damage). If the result of this roll is within the malfunction range,

then a malfunction has occurred and the player makes a d100-20 roll on the Malfunction Table.

⊛ SysOp's Note: Power Cells

For ease, the following information is repeated from the HARP SF rulebook. Double prices for Early versions; halve prices for Advanced versions.

Utility Power Cell: This is a relatively large battery (10 cm cube) designed to power large devices and machines. It can store up to 200 energy units and may be fully recharged in one hour from a suitable generator. One energy unit will normally power a device for one day. (Early versions store 100 units and take two hours to recharge; Advanced versions have 400 energy unit capacities.)

Utility Power Minicell: This is a small battery (2 cm cube) designed to power handheld and similar small devices. It can store up to 20 energy units and may be fully recharged in two hours from a suitable generator. One energy unit will normally power a device for one day. (Early versions store 10 units and take four hours to recharge; Advanced versions have 40 energy unit capacities and take one hour to recharge.)

Weapon Power Cell: This is a medium-sized battery (5 cm cube) capable of providing short intense bursts of power for use with energy weapons. It can provide 100 energy units (or shots) before requiring one hour to fully recharge. For weapons, which don't use power for shots, one energy unit will keep the device operational for one day. (Early versions store 50 units and take two hours to recharge; Advanced versions have 200 energy unit capacities.)

Weapon Power Minicell: This is a smaller version (a 2 cm cube) of the weapons-grade power cell. It can provide 20 energy units (or shots) before requiring one hour to fully recharge. For weapons, which don't use power for shots, one energy unit will keep the device operational for one day. (Early versions store 10 units and take two hours to recharge; Advanced versions have 40 energy unit capacities.)

Item	Avail	Cost	Mass
Utility Power Cell	U	20	0.1
Utility Power Minicell	U	10	0.02
Weapon Power Cell	U	30	0.2
Weapon Power Minicell	U	15	0.05

⊛ Accidental Damage

Accidents happen. Any time a robot fumbles a physical maneuver (typically Athletic, Combat, Outdoors, or Physical skills, but other skills at SysOp's discretion), a malfunction roll must be made. If the result is in the malfunction range, then a d100 roll should be made on the Malfunction Table.

⊛ Extremes of Gravity

Robots receive the same advantages in terms of enhanced effective strength as biological characters when operating in lower gravity field than they were designed for. In game terms, this translates as a +5 bonus to all Strength maneuvers and skills, which use the Strength stat, for every full 0.5g difference between the low gravity field and the character's native gravity.

> **❽ Example:** *Martian gravity is one-third that of Earth, approximately 0.33g. Thus native Earth robots would have a +5 bonus to all Strength-based maneuvers, notably Climbing, most Combat skills, and almost all Physical skills.*

> **❽ Example:** *A character from a much higher gravity world, say a 2.5g world like Jupiter, would have a +20 bonus. (2.5 – 0.33 = 2.17g difference.)*

Although robots suffer no medical adverse effects per se in zero gravity, micro-gravity or low-gravity, they do have an increased malfunction range in such environments. For gravity fields, that are at least 0.25g lower than a character's native gravity, increase the malfunction range by 5 (so an undamaged robot's malfunction range would be 01-10; a robot with a jury-rig repair would be 01-30). For micro-gravity and zero gravity, increase the malfunction range by an additional 5 (to 01-15 and 01-35 respectively.) Robots with the Low Gravity Tolerance Talent do **not** have their malfunction ranges increased. All robots, however, must still develop the Zero G Maneuvering skill for effective operation in zero gravity and micro-gravity.

Robots do not suffer adverse effects from long-term exposure to high gravity, but they do receive penalties to all maneuvers performed in high gravity.

For a normal robot design, the maneuver penalty is –5 for every 0.1g (-50 per 1g) above the normal gravitational field (1g for human designed robots).

A robot with the High Gravity Construction Talent only receives a –5 penalty for every 1g above the normal gravitational field.

Robots do not fall unconscious when the gravitational penalty reaches or exceeds –200. They merely become unable to move physically.

⊛ Extreme High Pressure and Vacuum

Normal robotic designs may operate safely in any environment where the "atmospheric" pressure is no greater than 5 Earth atmospheres. Robots with the High Pressure Construction Talent may function normally in elevated pressures in any medium.

For every ten minutes that a robot is exposed to elevated pressures beyond its safe range, a malfunction roll must be made as the robot may suffer damage from the crushing effect of the air, water or other medium. If a malfunction occurs, its severity will vary in proportion to the excess pressure:

Table 4.9 Extreme Pressure and Robotic Malfunctions	
d100–20	Up to 5 Earth atmospheres above safe range
d100–10	Up to 10 Earth atmospheres above safe range
d100	Up to 25 Earth atmospheres above safe range
d100+10	Up to 50 Earth atmospheres above safe range
d100+20	More than 50 Earth atmospheres above safe range
Any malfunction will affect the entire robot.	

While robots do not need to breathe, low pressure and especially vacuum pose their own insidious dangers. Robots generate waste heat as a byproduct of normal operation, and this heat must be discharged to the environment through some combination of conduction, convection and radiation. In low-pressure regions and in vacuum, convection becomes steadily less effective until it is non-existent in vacuum, forcing the robot to rely on conduction and radiation. Table 4.10 gives the malfunction severities and how often a malfunction roll must be made at certain atmospheric ranges. Any malfunction will affect the entire robot. Robots with the Vacuum Tolerance Talent are unaffected by low pressure and vacuum conditions.

Table 4.10 Low Pressure and Robotic Malfunctions		
Malfunction Roll	Frequency	Atmospheric Range
d100−20	Once per day	0.51 to 0.8 Earth atmosphere
d100−10	Once per 6 hours	0.26 to 0.5 Earth atmosphere
d100	Once per hour	0.11 to 0.25 Earth atmosphere
d100+10	Once per ten minutes	0.06 to 0.1 Earth atmosphere
d100+20	Once per minute	0.05 Earth atmosphere or less

Extreme Temperatures

All robots can operate safely within a broad range of temperatures, from −10 degrees Celsius up to 50 degrees Celsius. Robots with Talents such as Extreme Cold Tolerance and Extreme Heat Tolerance can function in more arduous environments. In surroundings above and below the safe temperature range, robots may suffer damage.

For every full ten minutes that a robot is exposed to ambient temperatures below or above the safe range, a malfunction roll must be made. If a malfunction occurs, the severity of the malfunction depends on how far the environment is outside the normal operating temperature for the robot:

Table 4.11 Temperature Differentials and Robotic Malfunctions		
d100−20	Up to 10 degrees lower	Up to 20 degrees higher
d100−10	Up to 30 degrees lower	Up to 50 degrees higher
d100	Up to 80 degrees lower	Up to 100 degrees higher
d100+10	Up to 180 degrees lower	Up to 200 degrees higher
d100+20	More than 180 degrees lower	More than 200 degrees higher
Any malfunction will affect the entire robot.		

Electromagnetic and Radiation Hazards

Radiation and electromagnetic pulses can corrupt or even completely destroy a robotic personality. A functional magneto-gravitic shield will protect completely against such hazards, but robots will not always be fortunate enough to be so protected.

Whenever a robot is exposed to an electromagnetic or radiation danger, the character must make an Electronic Cascading Resistance Roll, adding its Resistance: Electronic skill and any bonus from an EMP Shielded Talent. The result is then looked up on the following table:

Table 4.12 Electromagnetic and Radiation Hazards for Robots	
CRR(Target)	No effect
CRR(Target − 25)	1d100−20 on the Robot Neuro Critical Table
CRR(Target − 50)	1d100−10 on the Robot Neuro Critical Table
CRR(Target − 75)	1d100 on the Robot Neuro Critical Table
CRR(Target − 100)	1d100+10 on the Robot Neuro Critical Table
Failure	1d100+20 on the Robot Neuro Critical Table

The Target number can be found in the description of the electromagnetic pulse weapon (see HARP SF, Equipment chapter) or in the table of radiation events (see HARP SF, Adventuring chapter).

Immersion in Liquids

Unless a robot possesses the Waterproof Talent, it is susceptible to damage from immersion in water and similar solvents, and a malfunction roll must be made for every ten minutes (or part thereof) that the robot is partially or fully immersed in water, such as being dunked into a large body of water, hosed down with a water cannon (although that may also yield an Impact critical), caught in a torrential downpour, etc.

Physical Damage and Combat

Robots are just as likely as biological characters to find themselves in brawls, firefights, or dangerous situations such as falls, burning buildings, electrical storms, being doused with acid, dropped into a lava pool, and so forth. For biological characters, any potential injury from such happenings will normally come from one or more critical tables, where the damage is couched in terms of hits, bleeding and the like. Such effects are not appropriate for robots and androids, so instead four special critical tables are provided at the end of this chapter.

"Biological" critical tables are mapped to Robotic criticals as follows:

Table 4.13 Mapping of Biological Criticals and Robotic Criticals	
Robotic Melee	Crush, Puncture, Slash, Grapple, Martial Arts Strikes, Martial Arts Sweeps, Impact
Robotic Neuro	Neuro, Radiation
Robotic Piercing	Ballistic Impact, Ballistic Puncture, External Poison, Shrapnel
Robotic Energy	Blaster, Cold, Electrical, Heat, Laser, Plasma

Robot Malfunctions and Repair

The SysOp must decide if a malfunction has affected the entire robot or whether the damage is confined to a single area. If the damage is general, then any penalties to maneuvers are applied to all skills involving physical stats and the cost to repair is a percentage of the robot's basic body. If the damage is specific, then maneuver penalties are only applied to skills involving that particular portion

of the robot's body and the cost to repair is a percentage of the unit's cost (see prices associated with Robotic Talents).

The normal rules for repairing equipment apply to robots. Damage in terms of lost Endurance points takes 30 minutes per point of damage, costs 200 credits per point for materials and requires a successful Engineering (Cybernetics) maneuver. Stopping a hydraulic leak takes three rounds and requires a Light (+20) Engineering (Cybernetics) maneuver. Replenishing the hydraulic fluids in a robotic limb takes ten minutes, costs 200 credits for materials, and requires an Engineering (Cybernetics) maneuver. Software corruption, either by software viruses, electromagnetic weapons or radiation hazards, requires a Computer Programming maneuver or the reloading of the robot's personality from a safe archived copy.

⊘ Robot Injury and Death

Robots can suffer damage in the form of concussion hits, leakage of hydraulic fluids (which leads to limb immobility), maneuver penalties, software corruption, partial disablement, and destruction of part or all of its body.

Once a robot's concussion hits fall to or below 0, the robot automatically performs an emergency shutdown. If the robot is later repaired such that its concussion hits exceed 0, it will reboot and be able to function normally.

Once a robot's concussion hits fall below a negative number equal to the character's Constitution stat (not the stat bonus, but the stat itself), the robot body "dies" and cannot be repaired as the damage is too great.

Typically robots will have their personality stored on a core cylinder (as found in mobile personality storage units), in which case the cylinder can be removed even from a severely damaged robot body. Removal requires a Medium All-or-Nothing Engineering (Cybernetics) maneuver and requires five rounds (usually). If the body has been completely destroyed, then the core cylinder will be destroyed with it.

Of course, if a copy of the robot personality exists, it can be downloaded or plugged into a new body.

EXAMPLE ROBOTS

The example robots presented in this section can be used as the basis for PC robot characters, NPC robots or as customizable templates for the SysOp to use as a starting point to create new robotic and android designs. All example robots have been developed to 1st level only and some Development Points have been left available for SysOp and/or player customization.

❯ COMBAT ROBOT
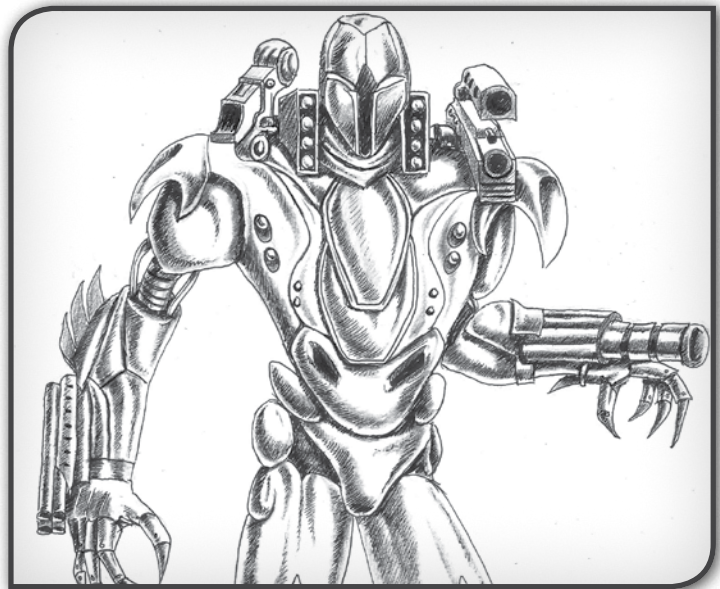
Description: The Combat Robot is a killing machine, period. Its form is an angular humanoid abstraction, all straight lines and sharp edges. By dint of extremely careful bracing, the Combat Robot has an assault laser mounted on one arm and an assault rifle mounted on the other. Certain megacorporations have experimented with gravitic models where the legs are replaced with a half-meter cylindrical housing gravitic propulsion. All Combat Robot designs are considered Restricted technology.

Stats: St:75(+5); Co:75(+5); Ag:75(+5); Qu:75(+5); SD:75(+5); Re:75(+5); In:75(+5); Pr:75(+5)

Hits: 110; PP: 0; PEP: 0;

Profession: Soldier

Adolescence and Starting Skills: Combat Style (Two Gun Combo):(4) 40; Computer Operation:(2) 20; Computer Programming:(1) 15; Driving (1) 15; Endurance:(8)110; Mundane Lore (Tactics):(2) 20; Perception:(3) 25; Resistance (Electronic):(1) 35; Resistance (Stamina): (1) 15; Resistance (Will):(1) 25; Signaling:(2) 20; Sniping:(2) 20; Weapon Skill (2-Handed Energy):(6) 40; Weapon Skill (2-Handed Projectile):(6) 40; Zero-G Maneuvering:(2) 20; 19 skill ranks in Linguistics

Special Abilities: Biological Immunities, High Body Density, Internal Clock, Perfect Memory, Self Contained, Zero Sleep.

Professional Abilities (suggested): Lightning Reflexes, +10 to Combat Styles (Two Gun Combo)

Talents: Ambidexterous Design [10 DPs, 20,000], Armored Body [10 DPs, +20, 400,000], EMP Shielded [4 DPs, +10, 40,000], Integrated Equipment (radio) [2 DPs, 2,000], Weapons System (assault laser) [2 DPs, 9,000], Weapons System (assault rifle) [2 DPs, 3,000], Walker Locomotion [8 DPs, 8,000], Manipulator Limbs [10 DPs, 10,000], Audio Amplifier [2 DPs, +10, 2000], Directional Audio [2 DPs, 200], Normal Audio [6 DPs, 6,000], Antiglare Vision [2 DPs, 200], Low Light Vision [2 DPs, 500], Normal Vision [6 DPs, 6,000], Cryptocomms [4 DPs, 200], Voice [4 DPs, 4,000]

Total Cost: 1,129,100

DPs Remaining: 20

COMPANION ANDROID
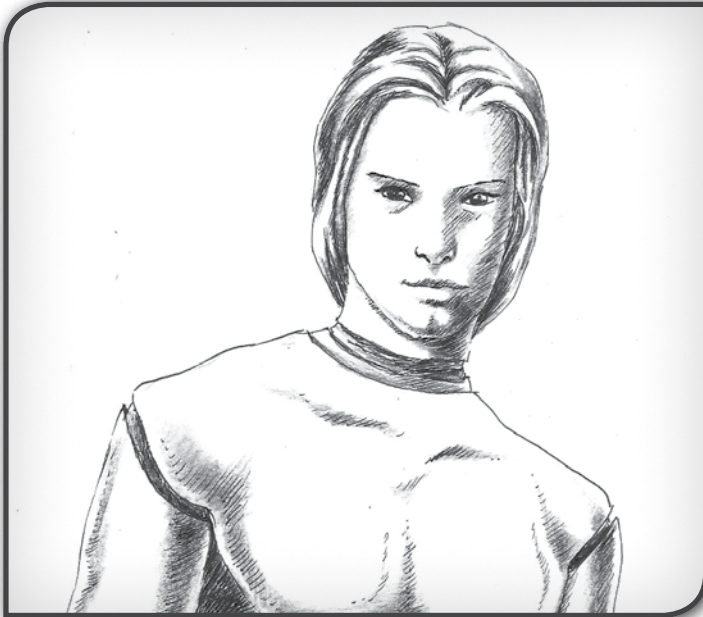
Description: Companion Androids are marketed as utterly loyal, totally discreet cybernetic friends. In some circles, Companion Androids are considered the perfect butler or maidservant. Their outer design is as life-like and natural as possible. Many Companions are handsome, most are beautiful, almost all are modeled according to the prevailing standard of beauty of their designer's species. There is a flourishing black market in Companion Androids for "personal" services in many societies.

Stats: St:75(+5); Co:75(+5); Ag:75(+5); Qu:75(+5); SD:75(+5); Re:75(+5); In:75(+5); Pr:75(+5)

Hits: 60; PP: 0; PEP: 0;

Profession: Entertainer

Adolescence and Starting Skills: Acting:(3): 25; Computer Operation:(1) 15; Computer Programming:(1) 15; Dancing:(2): 20; Driving:(2) 20; Duping:(3) 25; Endurance:(1) 75; First Aid:(1) 15; Jumping:(1): 15; Mundane Lore:(3) 25; Perception:(1) 15; Play Instrument:(2) 20; Public Speaking:(3) 25; Resistance (Electronic):(1) 35; Resistance (Stamina):(1) 15; Resistance (Will):(1) 25; Singing:(2) 20; Sports:(3) 25; Stalking & Hiding:(1) 15; Storytelling:(2) 30; Vocation (Servant):(5) 35; 19 skill ranks in Linguistics

Special Abilities: Biological Immunities, Internal Clock, Perfect Memory, Self Contained, Zero Sleep.

Professional Abilities (suggested): Natural Linguist, +10 to Storytelling

Talents: Biological Surface [2 DP, 100,000], Concealed Storage [2 DPs, 2,000], EMP Shielded [2 DPs, +5, 20,000], Flotation [10, 50,000], Walker Locomotion [8 DPs, 8,000], Manipulator Limbs [10 DPs, 10,000], Directional Audio [2 DPs, 200], Normal Audio [6 DPs, 6,000], Normal Vision [6 DPs, 6,000], Olfactory Sense [5 DPs, 5000], Tactile Sense [5 DPs, 5000], Taste Sense [5 DPs, 5000], Voice [4 DPs, 4,000], Voice Modulator [4 DPs, 500], Waterproof [5 DPs, 50,000]

Total Cost: 875,700

DPs Remaining: 24

ESPIONAGE ANDROID
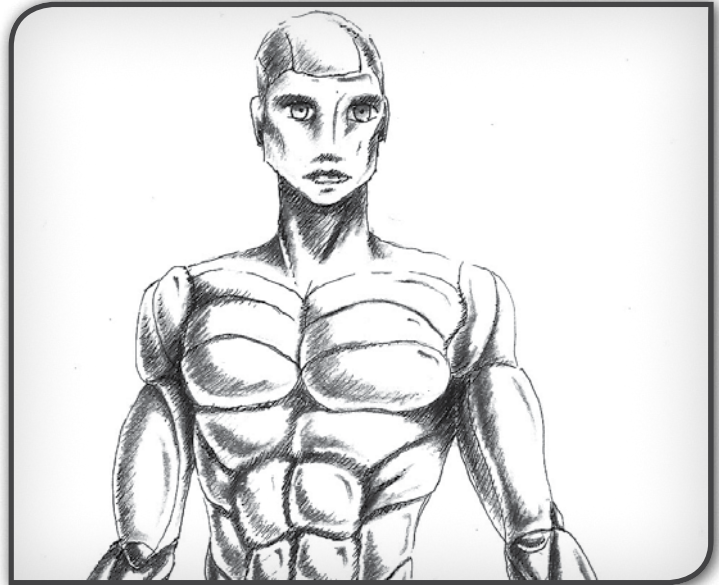
Description: An Espionage Android is designed to mimic members of a specific species. Espionage Androids may be deployed in short-term infiltration missions or as long-term "sleepers" awaiting a particular moment to strike. Their abilities assist in surreptitious collection of information. Carefully timed hacking of sensors and datalinks can ensure that their robotic nature is not revealed before their work is complete.

Stats: St:75(+5); Co:75(+5); Ag:75(+5); Qu:75(+5); SD:75(+5); Re:75(+5); In:75(+5); Pr:75(+5)

Hits: 80; PP: 0; PEP: 0;

Profession: Spy

Adolescence and Starting Skills: Acting: (1) 15; Climbing:(1) 15; Computer Hacking: (3) 25; Computer Operation: (1) 15; Computer Programming: (2) 20; Duping: (3) 25; Electronic Bypass: (3) 35; Endurance: (2) 80; Forensics: (2) 20; Jumping: (1) 15; Locks & Traps: (1) 15; Machine Operation: (2) 20; Mimicry: (1) 15; Perception: (4) 30; Resistance (Electronic):(1) 35; Resistance (Stamina):(1) 15; Resistance (Will):(1) 25; Signaling: (1) 15; Stalking & Hiding:(3) 25; Weapon Skill (1 Handed Energy): (3) 25; Weapon Skill (1 Handed Projectile): (2) 20; Zero-G Maneuvering:(2) 20; 19 skill ranks in Linguistics

Special Abilities: Biological Immunities, High Body Density, Internal Clock, Perfect Memory, Self Contained, Zero Sleep.

Professional Abilities (suggested): Judge of Value, +10 to Electronic Bypass

Talents: Biological Surface [2 DP, 100,000], Concealed Storage [2 DPs, 2,000], EMP Shielded [8 DPs, +20, 80,000], Weapons System (needle pistol) [2 DPs, 2,500], Walker Locomotion [8 DPs, 8,000], Manipulator Limbs [10 DPs, 10,000], Audio Amplifier [2 DPs, +10, 2000], Directional Audio [2 DPs, 200], Normal Audio [6 DPs, 6,000], Low Light Vision [2 DPs, 500], Normal Vision [6 DPs, 6,000], Telescopic Focusing [2 DPs, 500], Cryptocomms [4 DPs, 200], Voice [4 DPs, 4,000], Voice Emulator [4 DPs, 1,000], Waterproof [5 DPs, 50,000]

Total Cost: 878,900

DPs Remaining: 29

⊗EXPLORER ROBOT
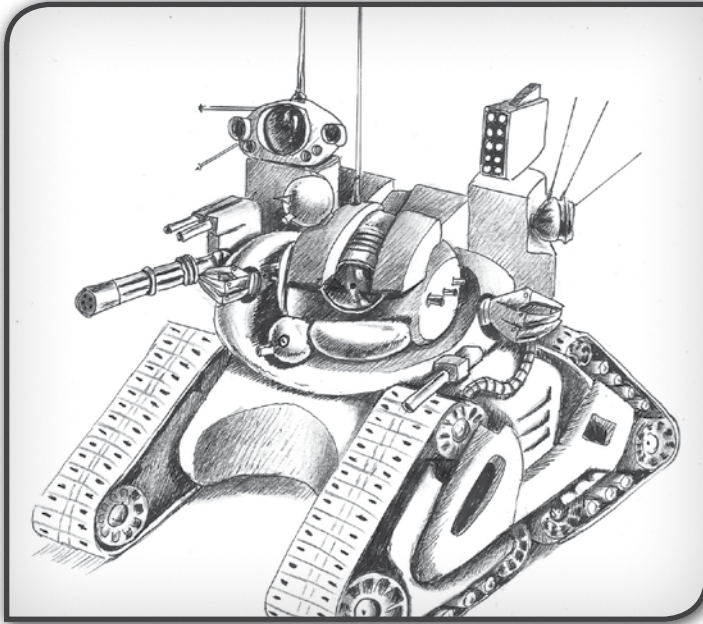
Description: Built like a miniature tank, the Explorer Robot is a rugged survivor, bristling with sensors. Its manipulator arms can be extended from their normal position beside the top chassis to collect samples. Armed, armored, and able to blend into its environment, the Explorer Robot is often the first to tread the surface of a new world. Other models exist featuring gravitic locomotion or defenses against very hostile environments.
Stats: St:75(+5); Co:75(+5); Ag:75(+5); Qu:75(+5); SD:75(+5); Re:75(+5); In:75(+5); Pr:75(+5)
Hits: 75; PP: 0; PEP: 0;
Profession: Scout
Adolescence and Starting Skills: Biology: (1) 15; Chemistry: (1) 15; Climbing: (1) 15; Computer Operation: (1) 15; Driving:(2) 20; Endurance:(1) 75; Jumping:(1) 15; Machine Operation: (2) 20; Navigation: (6) 50; Perception: (3) 25; Planetology: (2) 20; Resistance (Electronic):(1) 35; Resistance (Stamina):(1) 15; Resistance (Will):(1) 25; Signaling: (2) 20; Stalking & Hiding:(2) 20; Survival: (5) 35; Weapon Skill (1-Handed Energy): (5) 35; Xenology: (2) 20; 19 skill ranks in Linguistics
Special Abilities: Biological Immunities, High Body Density, Internal Clock, Perfect Memory, Self Contained, Zero Sleep.
Professional Abilities (suggested): Xenophile, +10 to Navigation
Talents: Armored Body [5 DPs, +10, 200,000], Chameleon Surface [5 DPs, 50,000], EMP Shielded [4 DPs, +10, 40,000], Integrated Equipment (radio) [2 DPs, 2,000], Integrated Equipment (scanner) [2 DPs, 4,000], Weapons System (laser pistol) [2 DPs, 2,000], Tracked Locomotion [4 DPs, 4,000], Manipulator Limbs [10 DPs, 10,000], Audio Amplifier [2, +10, 2000], Directional Audio [2 DPs, 200], Normal Audio [6 DPs, 6,000], Antiglare Vision [2 DPs, 200], Low Light Vision [2 DPs, 500], Normal Vision [6 DPs, 6,000], Thermal Imaging [4 DPs, 1000], Voice [4 DPs, 4,000], Waterproof [5 DPs, 50,000]
Total Cost: 985,800
DPs Remaining: 33

⊗MEDICAL ROBOT
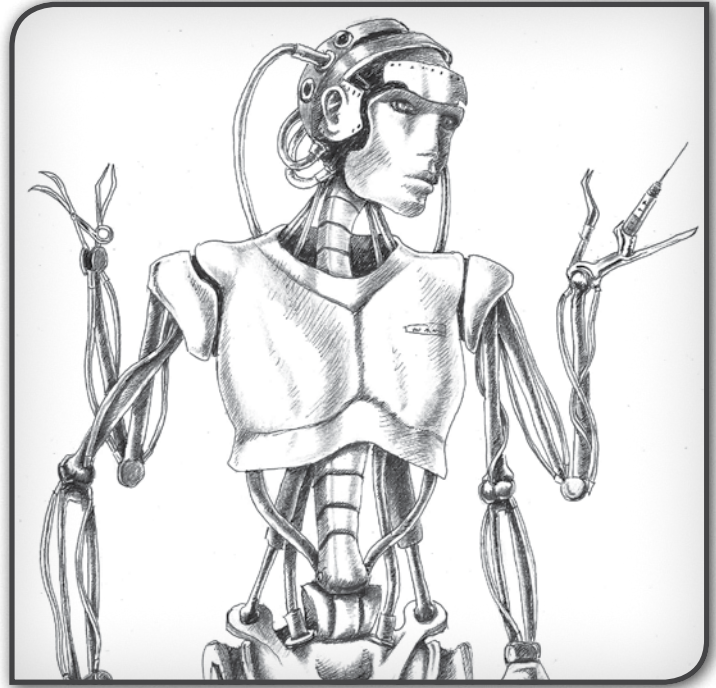
Description: A caricature of the form of their designer's species, Medical Robots lack the personal touch of biological nurses and doctors. Indeed, their skeletal build, long thin arms, and surgical tool hands can give them a rather terrifying appearance when unexpectedly encountered. Most Medical Robots overcompensate for this with extreme courtesy and a professional manner.
Stats: St:75(+5); Co:75(+5); Ag:75(+5); Qu:75(+5); SD:75(+5); Re:75(+5); In:75(+5); Pr:75(+5)
Hits: 75; PP: 0; PEP: 0;
Profession: Researcher
Adolescence and Starting Skills: Audiovisual Recording:(2) 20; Biology: (3) 25; Chemistry: (2) 20; Computer Operation: (2) 20; Engineering (cybernetics):(2) 20; First Aid: (6) 50; Endurance:(1) 75; Jumping:(1) 15; Medical Practice: (6) 50; Medical Science: (6) 50; Perception: (3) 25; Psychology: (1) 15; Resistance (Electronic):(1) 35; Resistance (Stamina):(1) 15; Resistance (Will):(1) 25; Xenology: (2) 20; 19 skill ranks in Linguistics
Special Abilities: Biological Immunities, High Body Density, Internal Clock, Perfect Memory, Self Contained, Zero Sleep.
Professional Abilities (suggested): Physician, +10 to Medical Practice
Talents: EMP Shielded [4 DPs, +10, 40,000], Integrated Equipment (bioscanner) [2 DPs, 4,000], Integrated Equipment (medical scanner) [2 DPs, 10,000], Walker Locomotion [8 DPs, 8,000], Manipulator Limbs [10 DPs, 10,000], Tool Option [4 DPs, 500], Normal Audio [6 DPs, 6,000], Low Light Vision [2 DPs, 500], Microvision [4 DPs, 1000], Normal Vision [6 DPs, 6,000], Tactile Sense [5 DPs, 5000], Knowledge Package (Medical Practice) [2 DPs, 5,000], Radiocommunicator [2 DPs, 2,000], Voice [4 DPs, 4,000], Waterproof [5 DPs, 50,000]
Total Cost: 756,000
DPs Remaining: 34

REPAIR ROBOT
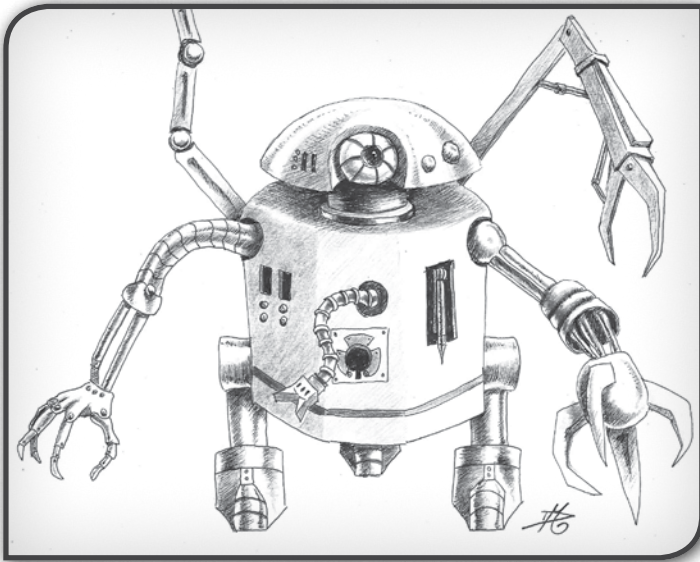
Description: Commonly designed as one-meter tall cylinders with stubby legs on wheels and long manipulator arms, Repair Robots can perform extremely delicate maintenance in confined spaces and hazardous environments. Really large jobs (particularly involving heavy lifting) will necessitate the deployment of multiple robots working in cooperation. Variants exist specifically designed for work in space and extreme planetary environments.

Stats: St:75(+5); Co:75(+5); Ag:75(+5); Qu:75(+5); SD:75(+5); Re:75(+5); In:75(+5); Pr:75(+5)

Hits: 75; PP: 0; PEP: 0;

Profession: Tech

Adolescence and Starting Skills: Chemistry:(1) 15; Computer Operation: (2) 20; Computer Programming: (5) 45; Driving:(2) 20; five Engineering skills: (3) 25; Endurance:(1) 75; Jumping:(1) 15; Machine Operation: (6) 40; Mathematics:(2) 20; Perception: (1) 15; Physics:(1) 15; Resistance (Electronic):(1) 35; Resistance (Stamina): (1) 15; Resistance (Will):(1) 25; 19 skill ranks in Linguistics

Special Abilities: Biological Immunities, High Body Density, Internal Clock, Perfect Memory, Self Contained, Zero Sleep.

Professional Abilities: Fast Fixer, +10 to Computer Programming

Talents: Armored Body [5 DPs, +10, 200,000], Concealed Storage [2 DPs, 2,000], EMP Shielded [4 DPs, +10, 40,000], Integrated Equipment (mini-microscope) [2 DPs, 20,000], Integrated Equipment (techscanner) [2 DPs, 5,000], Wheeled Locomotion [2 DPs, 2,000], Manipulator Limbs [10 DPs, 10,000], Grip Lock [2 DPs, 1000], Tool Option [4 DPs, 500], Audio Amplifier [2, +10, 2000], Audio Antisound [4 DPs, 300], Directional Audio [2 DPs, 200], Normal Audio [6 DPs, 6,000], Antiglare Vision [2 DPs, 200], Low Light Vision [2 DPs, 500], Microvision [4 DPs, 1000], Normal Vision [6 DPs, 6,000], Dataconnection [2 DPs, 2000], Radiocommunicator [2 DPs, 2,000], Waterproof [5 DPs, 50,000]

Total Cost: 950,700

DPs Remaining: 30

SECURITY ROBOT
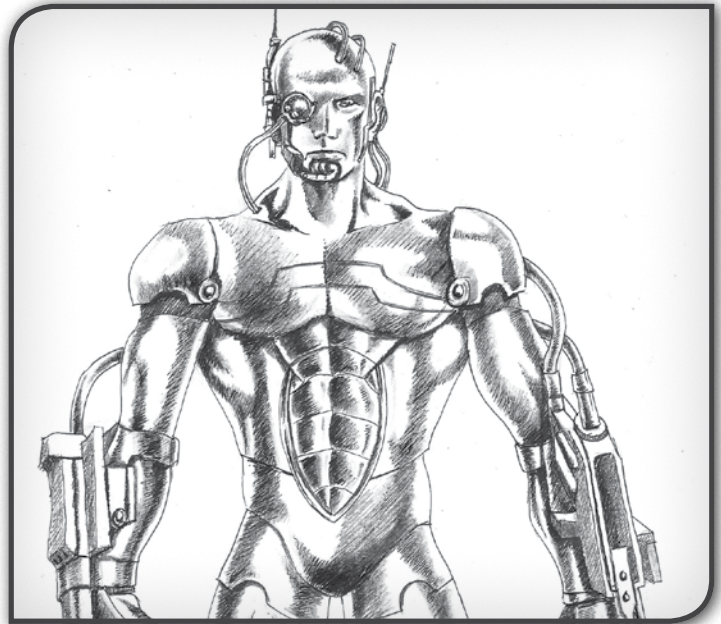
Description: In poor light or from the right angle, a Security Robot might be mistaken for a particularly big and muscular individual (of a particular species). Up close, the cybernetic nature of this sentry is apparent from its gleaming chrome surface and arm-mounted weaponry. Standard programming for a Security Robot is to use nonlethal force when subduing perceived threats; lethal force is reserved for retaliation against armed opponents.

Stats: St:75(+5); Co:75(+5); Ag:75(+5); Qu:75(+5); SD:75(+5); Re:75(+5); In:75(+5); Pr:75(+5)

Hits: 100; PP: 0; PEP: 0;

Profession: Soldier

Adolescence and Starting Skills: Audiovisual Recording: (2) 20; Climbing:(2) 20; Combat Style (Two Gun Combo):(6) 40; Computer Operation: (2) 20; Driving:(1) 15; Forensics: (2) 20; Interrogation: (1) 15; Endurance:(6) 100; Jumping:(2) 20; Machine Operation: (3) 25; Perception: (6) 40; Resistance (Electronic):(1) 35; Resistance (Stamina): (1) 15; Resistance (Will):(1) 25; Signaling: (2) 20; Weapon Skill (1 Handed Energy): (6) 40; 19 skill ranks in Linguistics

Special Abilities: Biological Immunities, High Body Density, Internal Clock, Perfect Memory, Self Contained, Zero Sleep.

Professional Abilities (suggested): Lightning Reflexes, +10 to one Weapons skill

Talents: Ambidexterous Design [10 DPs, 20,000], Armored Body [10 DPs, +20, 400,000], EMP Shielded [6 DPs, +15, 60,000], Integrated Equipment (retinal scanner) [2 DPs, 2,750], Weapons System (laser pistol) [2 DPs, 2,000], Weapons System (electrostunner) [2 DPs, 3,000], Walker Locomotion [8 DPs, 8,000], Manipulator Limbs [10 DPs, 10,000], Audio Amplifier [3, +15, 3000], Directional Audio [2 DPs, 200], Normal Audio [6 DPs, 6,000], Low Light Vision [2 DPs, 500], Motion Sensing Vision [2 DPs, 1000], Normal Vision [6 DPs, 6,000], Voice [4 DPs, 4,000]

Total Cost: 1,530,450

DPs Remaining: 25

❱TUTOR ANDROID
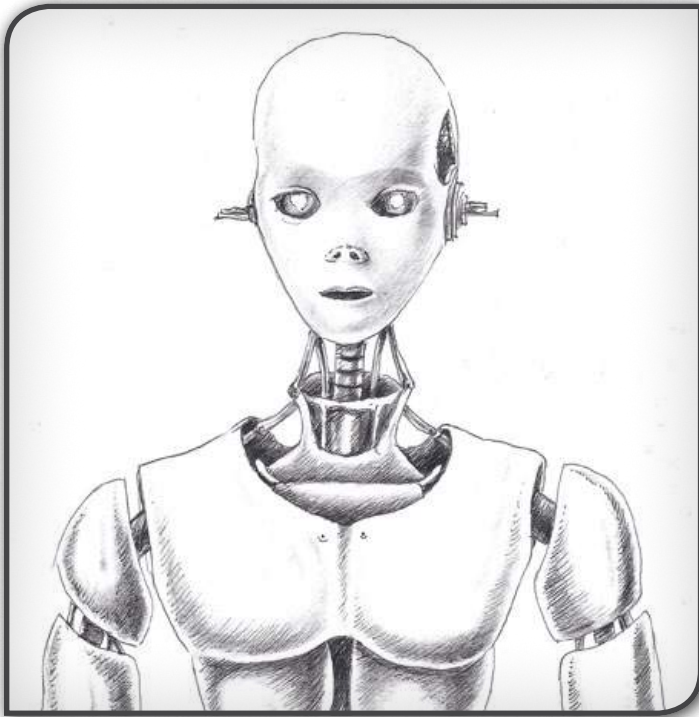
Description: Tutor Androids favor designs that are close approximations of the average individual of the chosen species. Bland, pleasant appearances and (attempted) inoffensive mannerisms are synonymous with Tutor Androids. Although the mainstay of their work is classroom teaching and private tuition, variant designs are available as personal aides and translators.

Stats: St:75(+5); Co:75(+5); Ag:75(+5); Qu:75(+5); SD:75(+5); Re:75(+5); In:75(+5); Pr:75(+5)

Hits: 75; PP: 0; PEP: 0;

Profession: Researcher

Adolescence Skills: Computer Operation: (2) 20; Computer Programming:(2) 20; Duping: (1) 15; First Aid: (1) 15; Endurance:(1) 75; Jumping:(1) 15; 1 Mundane Lore: (3) 45; 2 Mundane Lores : (3) 25; Perception: (2) 20; Resistance (Electronic):(1) 35; Resistance (Stamina): (1) 15; Resistance (Will):(1) 25; 1 Scientific Skill: (4) 40; 2 Scientific Skills: (4) 30; Storytelling:(1) 15; Vocation (teacher): (4) 30; Writing:(1) 15; 19 skill ranks in Linguistics

Special Abilities: Biological Immunities, High Body Density, Internal Clock, Perfect Memory, Self Contained, Zero Sleep.

Professional Abilities (suggested): Academic Specialization, +10 to one Scientific skill

Talents: Biological Surface [2 DP, 100,000], EMP Shielded [2 DPs, +5, 20,000], Integrated Equipment (radio) [2 DPs, 2,000], Walker Locomotion [8 DPs, 8,000], Manipulator Limbs [10 DPs, 10,000], Audio Amplifier [1, +5, 1000], Directional Audio [2 DPs, 200], Normal Audio [6 DPs, 6,000], Normal Vision [6 DPs, 6,000], Olfactory Sense [5 DPs, 5000], Tactile Sense [5 DPs, 5000], 3 Knowledge Packages [6 DPs, 15,000], Voice [4 DPs, 4,000], Waterproof [5, 50,000]

Total Cost: 836,200

DPs Remaining: 36

❱WORKER ROBOT
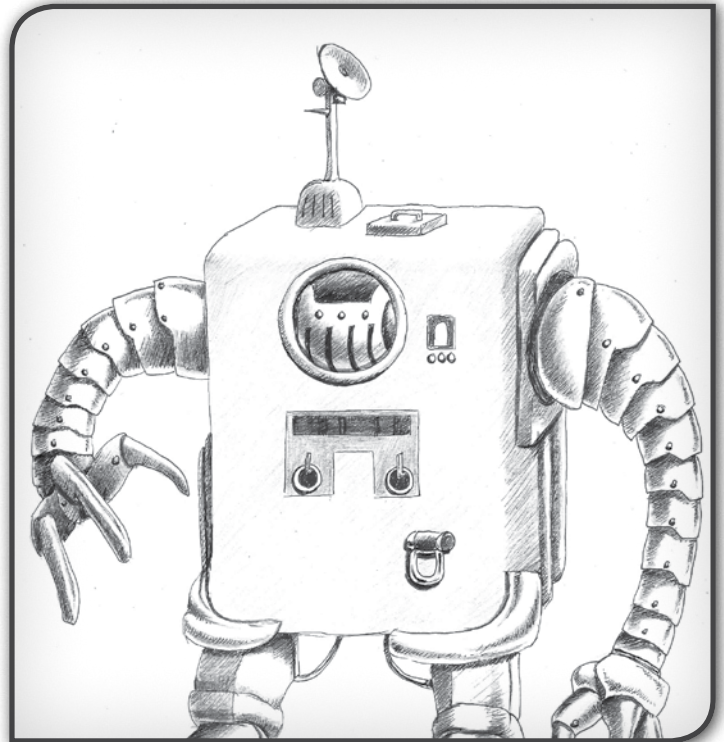
Description: Worker Robots may look like hulking boxes with cylindrical limbs, suited only to heavy lifting and monotonous simple tasks. In fact, they are highly efficient and skilled mechanical laborers, capable of performing intricate construction. Unlike biological employees, they can work non-stop and in conditions that would be hazardous to organic life. The model described below is an industrial factory unit. Other variants include agricultural laborers and mining robots.

Stats: St:75(+10); Co:75(+5); Ag:75(+10); Qu:75(+5); SD:75(+5); Re:75(+5); In:75(+5); Pr:75(+5)

Hits: 75; PP: 0; PEP: 0;

Profession: Dilettante

Adolescence Skills: Computer Operation: (6) 50; Computer Programming: (4) 30; 4 Engineering skills: (4) 30; Endurance:(1) 75; Jumping:(1) 15; Machine Operation: (6) 50; Perception: (3) 25; Resistance (Electronic):(1) 35; Resistance (Stamina): (1) 15; Resistance (Will):(1) 25; 19 skill ranks in Linguistics

Special Abilities: Biological Immunities, High Body Density, Internal Clock, Perfect Memory, Self Contained, Zero Sleep.

Professional Abilities: +10 to Computer Operation and Machine Operation skills

Talents: Agile Body [10 DPs, +5, 100,000], Strong Body [10 DPs, +5, 100,000], Wheeled Locomotion [2 DPs, 2,000], Manipulator Limbs [10 DPs, 10,000], Multiple Subskill Proficiency (Machine Operation: scanners, x2) [10 DPs], Tool Option [4 DPs, 500], Normal Audio [6 DPs, 6,000], Low Light Vision [2 DPs, 500], Microvision [4 DPs, 1000], Normal Vision [6 DPs, 6,000], Tactile Sense [5 DPs, 5000], Dataconnection [2 DPs, 2000], Waterproof [5, 50,000]

Total Cost: 987,000

DPs Remaining: 24

ROBOTIC CRITICAL TABLES

◉ Reading the Critical Tables

Each entry on the critical tables has two parts: the description of the attack, and its effects.

The description is included purely for dramatic flavor. SysOps are encouraged to modify the result to reflect the actual situation. For example, if a robotic foe uses gravitic locomotion and the description mentions damage to the robot's leg, the result should be reinterpreted as damage to the gravitic components. As always, common sense should prevail.

The second part of the attack description describes its effect. Attacks can have any of the following results:

Hits: This is damage that is subtracted from the target's total Concussion Hits. This represents minor damage, dents, gouges, scratches, chipping, and the like. If the description describes instant destruction, it still lists an amount of concussion hit damage. This damage represents the damage from the strike, and damage that must be repaired before the character's body can be restored to normal operation.

Stunned: If a robotic target is stunned, its programming is effectively stalled, pending integrity checking and software rebooting. It may not attack, although it may still parry melee attacks using up to one half of its Offensive Bonus. This parry is resolved in the same manner that a Full Parry is resolved. Any other action requiring a Maneuver roll receives a modifier of -50. Actions that do not require Maneuver rolls do not suffer penalties. Movement is limited to one-half BMR, maximum Pace of Run. When a robotic receives a result that says that they are Stunned for one or more rounds, the character can make an Electronic-based Resistance Roll. They must equal or beat a RR of 100 or they are stunned. If there is more than one round of Stun, the number to beat is raised by 10 for every round past the first.

> **⑧ Example:** *If the robot receives a critical that gives three rounds of Stun, then the character immediately makes an Electronic RR(120) or he is stunned for 3 rounds. (base of 100 + 10 for each round beyond the first = 120 total).*

Leakage: This represents a leak of hydraulic fluids from the robot. The severity of the leak is measured in rounds before all the fluid has drained out of that part of the robot. Once this happens, the leaking area of the robot (usually a limb) becomes immobilized.

Penalties: These are penalties on all Strength, Agility and Quickness Maneuvers (including OB). These penalties may reduce a character's DB, but only their Quickness bonus to their DB, not Defensive Bonuses received from other sources. These penalties cannot reduce a character's Quickness bonus below zero. These negative modifiers are the result of damage to essential robotic systems. If a character is stunned, combine the penalties from the stun with the penalties given separately. Once the Stun has worn off, its penalty (-50) is removed from those applied to all actions.

Disabled: One or more robotic subsystems (such as sensors, locomotion, manipulation) can be rendered inoperable. The subsystems are off-line and unusable until repaired, but are not totally destroyed.

Corrupted: This represents harm to the character's programming and personality routines and equates to penalties on all Insight, Presence, Reasoning, and Self Discipline Maneuvers. If a character is stunned, combine the penalties from the stun with the penalties given separately. Once the Stun has worn off, its penalty (-50) is removed from those applied to all actions.

Destruction: Instantaneous or eventual.

All attack results (except leakage) are cumulative. For example, characters stunned and at penalties from two separate attacks have the negative effects combined!

For multiple hydraulic leaks at the same location, the fluid will drain in the number of rounds given by the most severe leak, less one round for each additional leak.

> **⑧ Example:** *Marvin has received three leakage injuries on the same arm. The leaks will drain the arm in 10 rounds, 5 rounds, and 7 rounds, respectively. All the hydraulic fluid will pour out of the arm in 3 rounds (5 rounds for most severe leak – 2 for other leaks).*

All critical results give a suggested cost and time to repair any damage other than hits, leaks or stuns. The suggested cost is as a percentage of the robot's body for general damage – SysOps may choose instead to use the cost of the specific subsystem damaged.
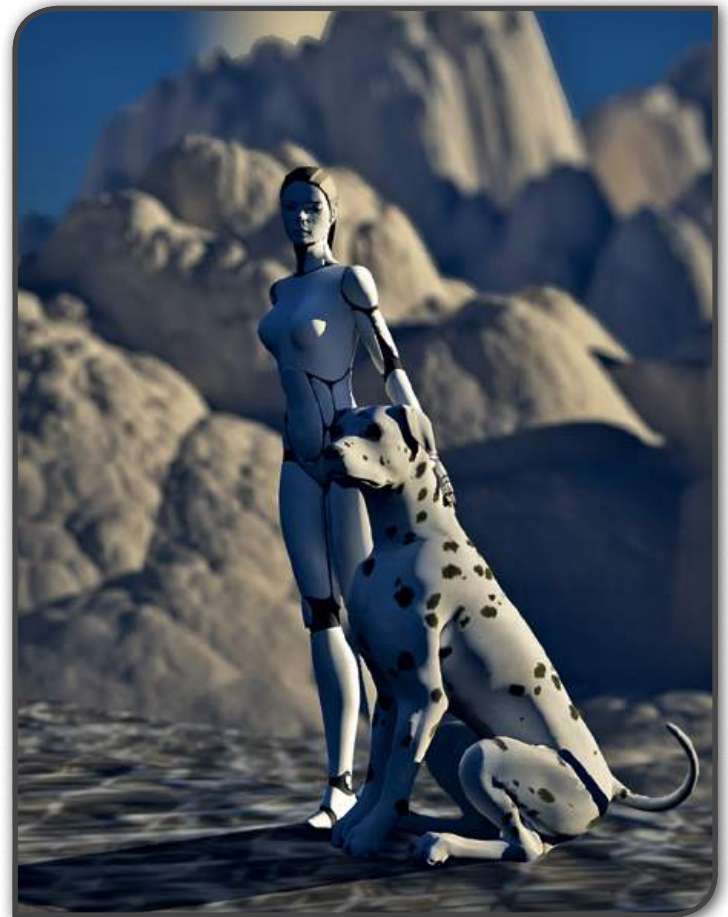
ROBOTIC ENERGY TABLES

Robotic Energy Criticals	
Roll	**Result**
(-19)-(-10)	I'm sure you did hit him. Foe takes 3 Hits.
(-9)-0	Not a bad shot, all things considered. Foe takes 6 Hits
1-10	Grazing burn damages any biological surface on one manipulator limb. Foe takes 9 Hits. (Time to repair: 30 minutes; Cost: 5%)
11-20	Scorch damage sears any biological surface on one locomotive limb. Foe suffers 10 Hits and is at −5. (Time to repair: 1 hour; Cost: 10%)
21-30	Midsection strike fries any biological surface on torso and damages some nearby circuitry. Foe takes 12 Hits and is at −5. (Time to repair: 1 hour; Cost: 10%)
31-40	Bolt penetrates through any biological surface (destroying it) on foe's manipulator limb. Foe is stunned 1 round, at a −5 penalty, and takes 15 Hits. (Time to repair: 1 hour; Cost: 10%)
41-50	Shot hits upper portion of robot's locomotive gear (destroying biological surface there) and damaging internal circuitry. Foe is stunned 1 round, at -10, and takes 18 Hits. (Time to repair: 2 hours; Cost: 15%)
51-60	Bolt strikes junction of manipulator arm and main body, causing hydraulic fluid to boil out. Foe is stunned 2 rounds, at −10, and takes 21 Hits. Fluid will be boiled out completely in 10 rounds. (Time to repair: 2 hours; Cost: 15%)
61-70	Direct torso strike fails to hit key circuitry. Better luck next time. Foe is still stunned 3 rounds, at −15, and takes 23 Hits. (Time to repair: 2 hours; Cost: 15%)
71-80	Bolt hits manipulator arm square on, burning off any biological or chameleon surface and disabling any integrated equipment or weapon system on that arm. Foe is stunned for 4 rounds, at −20, and takes 26 Hits. Hydraulic fluids will drain out of arm in 8 rounds. (Time to repair: 3 hours; Cost: 20%)
81-85	Foe wobbles as bolt tears into lower limbs. Foe is stunned for 5 rounds, at −20, and takes 29 Hits. Hydraulic fluid will boil out of locomotive gear completely in 5 rounds. (Time to repair: 3 hours; Cost: 20%)
86-90	Precision fire disables robot's auditory sensors, while the rest of the blast stuns foe for 6 rounds, puts it at a −25 penalty, and delivers 35 Hits. (Time to repair: 3 hours; Cost: 20%)
91-95	Worthy shot burns off any biological or chameleon surface on foe's head to reveal chrome underneath and disables any visual options (but not sensors themselves). Robot is stunned for 7 rounds, at −25 and takes 39 Hits. (Time to repair: 3 hours; Cost: 25%)
96-100	Top shooting! One of foe's manipulator arms (and any integrated equipment or weapons) is completely disabled as wave of fire melts most of the circuitry. Foe is stunned for 8 rounds, at −30, and suffers 42 Hits. (Time to repair: 4 hours; Cost: 25%)
101-105	That's one robot that won't be going anywhere. Blast has penetrated locomotive gear, disabling it completely. Foe takes 45 Hits, stunned for 10 rounds from electrical feedback, and at −40. (Time to repair: 4 hours; Cost: 25%)
106-110	Well-aimed shot burns a major hole through robot's upper torso, taking out all of the sensor circuitry. All sensors disabled. Foe takes 50 Hits, stunned for 12 rounds, and at −40. Still standing, though. (Time to repair: 6 hours; Cost: 30%)
111-115	Robot is now headless as blast melts head (destroying any sensors mounted on it). Next time, try to remember its brain is in its torso. Foe takes 55 Hits, stunned for 15 rounds, and at −50. (Time to repair: 8 hours; Cost: 40%)
116-119	Excellent work as you burn out its power supplies, disabling the robot completely. Foe takes 60 Hits, at −50, and is completely unable to act. (Time to repair: 10 hours; Cost: 40%)
120	Goodbye, Marvin. Perfect shot strikes personality unit and power supplies. Small internal explosion ends robot's existence. Foe is dead. Foe takes 65 Hits. (Time to repair and replace: 12 hours; Cost 50%)

Attack Size Modifiers	
Attack Size	Critical Modifier
Tiny	-20
Small	-10
Medium	0
Large	+10
Huge	+20

ROBOTIC MELEE CRITICALS

Robotic Melee Criticals	
Roll	**Result**
(-19) – (-10)	Explain to me again why your species is the pinnacle of evolution? 1 Hit.
(-9) – 0	Clang! 2 Hits.
01 – 10	You have a bad feeling about this. 3 Hits.
11 – 20	You dent your foe's torso. 4 Hits.
21 – 30	You hit foe's head. It is made of metal, you twit. 5 Hits.
31 – 40	Your blow hits foe's manipulator limb and strikes oil, well hydraulic fluid. Foe takes 6 Hits and limb will drain in 12 rounds.
41 – 50	Low blow catches foe's leg. Foe takes 7 Hits. Leak will drain leg in 10 rounds.
51 – 60	Strong blow rocks robot. Foe takes 8 Hits and is at −5. (Time to repair: 30 minutes; Cost: 5%)
61 – 70	Shaken, but not stirred. Foe takes 9 Hits and is at −10. (Time to repair: 1 hour; Cost: 5%)
71 – 80	Head strike disables auditory sensor options (but not basic hearing). Foe takes 10 Hits, is stunned 1 round, and is at -15. (Time to repair: 1 hour; Cost: 10%)
81 – 85	Chest blow disables foe's voice unit. Foe takes 12 Hits, is stunned 2 rounds, and is at -15. (Time to repair: 1 hour; Cost: 10%)
86 – 90	Desperate slash disables any weapon system and integrated equipment on foe's manipulator arm. Foe takes 14 Hits, is stunned 2 rounds, and is at −20. Hydraulic fluid will completely leak out in 8 rounds. (Time to repair: 2 hours; Cost: 15%)
91 – 95	So close. Blow disables foe's visual sensor options (but not basic vision). Still, robot takes 15 Hits, is stunned 3 rounds, and is at −20 from feedback issues. (Time to repair: 2 hours; Cost: 15%)
96 – 100	Hang on in there! Substantial damage to foe's locomotive gear. Foe takes 18 Hits, is stunned 4 rounds, and is at −25. Hydraulic fluid will empty out of its legs in 6 rounds. (Time to repair: 3 hours; Cost: 20%)
101 – 105	Satisfying attack disables one of foe's manipulator arms. Foe suffers 20 Hits, is stunned 5 rounds and is at −30. (Time to repair: 3 hours; Cost: 25%)
106 – 110	Reverberating attack disables foe's visual and auditory sensors. Foe takes 22 Hits, is stunned 6 rounds, and is at −35. (Time to repair: 4 hours; Cost: 25%)
111 – 115	Foe hits the deck as you smash up its legs. There are wires and pools of hydraulic fluid everywhere. Foe takes 25 Hits, is stunned 8 rounds, and is at −40. (Time to repair: 6 hours; Cost: 30%)
116 – 119	Foe blows multiple fuses as your blow eliminates key electrical transfer points. All manipulators and locomotive gear disabled. Foe takes 27 Hits, is stunned 10 rounds, and at −50. Impressive shower of sparks from torso. (Time to repair: 8 hours; Cost: 40%)
120	Your blow caves in foe's torso and crushes personality unit. It's over. Robot is dead. Foe takes 30 Hits. (Time to repair and replace: 10 hours; Cost 50%)

Attack Size Modifiers	
Attack Size	Critical Modifier
Tiny	-20
Small	-10
Medium	0
Large	+10
Huge	+20

❽ROBOTIC NEURO TABLES

Robotic Neuro Criticals	
Roll	**Result**
(-19) – (-10)	Temporary processing glitch. Stunned 1 round.
(-9) – 0	Checksum errors detected. Stunned 2 rounds to recover.
01 – 10	Transient internal communications overload. Stunned 3 rounds while it passes.
11 – 20	Stunned 4 rounds while waiting on error handling routines completing.
21 – 30	Is that an infinite loop in the code? Stunned 5 rounds until exit condition is triggered.
31 – 40	Parse error on Goto? You should sue the coder. Stunned 6 rounds.
41 – 50	Personality suffers −5 software corruption penalty. If available, sensory option (but not visual or auditory) is disabled for 1 minute. Stunned 7 rounds. (Time to repair: 30 minutes. Cost: 0%)
51 – 60	Personality suffers −5 software corruption penalty. If available, one audio or visual sense option (but not normal hearing or vision) is disabled for 1 minute. Stunned 8 rounds. (Time to repair: 30 minutes. Cost: 0%)
61 – 70	Personality suffers −10 software corruption penalty. If available, one integrated equipment or weapons system is disabled for 1 minute. Stunned 9 rounds. (Time to repair: 1 hour. Cost: 0%)
71 – 80	Personality suffers −10 software corruption penalty. If available, one manipulator arm is disabled for 1 minute. Stunned 10 rounds. (Time to repair: 1 hour. Cost: 0%)
81 – 85	Personality suffers −15 software corruption penalty. If available, all audio senses are disabled for 5 minutes. Stunned 12 rounds. (Time to repair: 2 hours. Cost: 0%)
86 – 90	Personality suffers −15 software corruption penalty. If available, locomotive gear is disabled for 5 minutes. Stunned 15 rounds. (Time to repair: 2 hours. Cost: 0%)
91 – 95	Personality suffers −20 software corruption penalty. If available, all sensory processor options are disabled for 10 minutes. Stunned 18 rounds. (Time to repair: 3 hours. Cost: 0%)
96 – 100	Personality suffers −20 software corruption penalty. If available, all visual senses are disabled for 10 minutes. Stunned 20 rounds. (Time to repair: 3 hours. Cost: 0%)
101 – 105	Personality suffers −25 software corruption penalty. If available, all software options are disabled for 20 minutes. Stunned 25 rounds. (Time to repair: 4 hours. Cost: 0%)
106 – 110	Personality suffers −30 software corruption penalty. If available, all manipulator limbs are disabled for 20 minutes. Stunned 30 rounds. (Time to repair: 6 hours. Cost: 0%)
111 – 115	Personality suffers −40 software corruption penalty. If available, entire body is disabled for 30 minutes. Stunned 30 rounds. (Time to repair: 8 hours. Cost: 0%)
116 – 119	Personality suffers −50 software corruption penalty. If it could, it would try singing "Daisy, daisy". If available, entire body is disabled for 1 hour. Stunned 30 rounds. (Time to repair: 12 hours. Cost: 0%)
120	Personality is completely scrambled into a random stream of meaningless binary data. Recovery is impossible. Where are your backup copies?

Attack Size Modifiers	
Attack Size	Critical Modifier
Tiny	-20
Small	-10
Medium	0
Large	+10
Huge	+20

ROBOTIC PIERCING TABLES

Robotic Piercing Criticals	
Roll	**Result**
(-19)-(-10)	Next time, try aiming first. 1 Hit
(-9)-0	You scratched the paintwork. 2 Hits
1-10	Grazing shot. 4 Hits
11-20	Robot is barely inconvenienced. 6 Hits. I wonder how many it will do to you?
21-30	Minor damage to manipulator limb. 8 Hits, but fluid will leak out completely in 12 rounds. (Time to repair: 30 minutes; Cost: 5%)
31-40	Bullet pierces lower leg. Foe takes 10 Hits and leaking fluids (10 rounds to drain completely). (Time to repair: 30 minutes; Cost: 5%)
41-50	Torso shot delivers 12 Hits and leaves foe at a −5 penalty. (Time to repair: 1 hour; Cost: 5%)
51-60	Bullet hits upper chest and mangles some circuitry as it passes through. Robot takes 14 Hits and is at 10. (Time to repair: 1 hour; Cost: 10%)
61-70	Bullet disables a sensor subsystem (not audio or visual). Robot is at −10, stunned 1 rounds, and takes 15 Hits. (Time to repair: 1 hour; Cost: 10%)
71-80	Robot's voice unit is disabled. Robot is stunned 2 rounds, at −10, suffers 16 Hits, and is speechless. (Time to repair: 2 hours; Cost: 10%)
81-85	Bullet smashes up a weapon system or integrated equipment unit. Robot takes 18 Hits from collateral damage, is stunned 2 rounds, and is at −15. (Time to repair: 2 hours; Cost: 15%)
86-90	Leg shot ruins vital components in leg. Foe takes 20 Hits, is stunned 3 rounds, and is at −20. Hydraulic fluid will drain completely in 6 rounds. (Time to repair: 3 hours; Cost: 15%)
91-95	Head shot disables audio sensors. Foe takes 22 Hits, is stunned 4 rounds and is at −25. (Time to repair: 3 hours; Cost: 20%)
96-100	Bullet intersects robot's principal manipulator limb at key joint. Foe takes 24 Hits, is stunned 4 rounds and is at −25. Limb is disabled. (Time to repair: 4 hours; Cost: 20%)
101-105	Lucky shot disables visual sensors. Foe is at −30, stunned 5 rounds, and takes 26 Hits. (Time to repair: 4 hours; Cost: 25%)
106-110	Robot decides to stay put as bullet disables locomotion completely. Engineer! Foe is at −35, stunned 6 rounds, and suffers 28 Hits. (Time to repair: 6 hours; Cost: 30%)
111-115	Bullet enters torso where it ricochets around knocking out vital connections. All robot sensors and manipulators disabled. I think it wants its designer. Foe takes 30 Hits, is stunned 7 rounds, and is at -40. (Time to repair: 8 hours; Cost: 40%)
116-119	Precise shot takes out robot's principal power supply. Power breakers trip preventing explosion but render robot completely inert. Foe takes 32 Hits, is stunned 8 rounds, and is at −50. Tendrils of smoke are coming from foe's torso. (Time to repair: 10 hours; Cost: 40%)
120	Top Gun! Your shot hits the personality unit dead center. This robot has been terminated. 35 Hits. (Time to repair and replace: 12 hours; Cost 50%)

Attack Size Modifiers	
Attack Size	Critical Modifier
Tiny	-20
Small	-10
Medium	0
Large	+10
Huge	+20

❽ROBOTIC MALFUNCTION TABLE

Roll	Result
(-19) – (-10)	What malfunction? Unit suffered transient failure but recovers in 1 round.
(-9) – 0	Unit suffers transient failure but recovers in 1 minute. Can be brought online in ten rounds by an engineer
01 – 10	Unit suffers temporary downtime and is off-line for ten minutes. Can be brought online in one minute by an engineer.
11 – 20	Unit damaged. −10 to maneuvers / 90% performance. Time to repair: 10 minutes. Cost: 5%
21 – 30	Unit damaged. −10 to maneuvers / 80% performance. Time to repair: 30 minutes. Cost: 5%
31 – 40	Unit damaged. −15 to maneuvers / 75% performance. Time to repair: 1 hour. Cost: 10%
41 – 50	Unit damaged. −15 to maneuvers / 70% performance. Time to repair: 1 hour. Cost: 10%
51 – 60	Unit damaged. −20 to maneuvers / 60% performance. Time to repair: 1 hour. Cost: 10%
61 – 70	Unit damaged. −20 to maneuvers / 50% performance. Time to repair: 2 hours. Cost: 15%.
71 – 80	Unit damaged. −25 to maneuvers / 40% performance. Time to repair: 2 hours. Cost: 15%
81 – 85	Unit damaged. −25 to maneuvers / 30% performance. Time to repair: 3 hours. Cost: 15%
86 – 90	Unit damaged. −30 to maneuvers / 25% performance. Time to repair: 3 hours. Cost: 15%
91 – 95	Unit damaged. −40 to maneuvers / 20% performance. Time to repair: 4 hours. Cost: 20%
96 – 100	Unit damaged. −50 to maneuvers / 10% performance. Time to repair: 4 hours. Cost: 20%
101 – 105	Unit disabled. −100 to maneuvers / 5% performance. Time to repair: 6 hours. Cost: 25%
106 – 110	Unit disabled. −100 to maneuvers / 5% performance. Time to repair: 8 hours. Cost: 30%
111 – 115	Unit disabled. −100 to maneuvers / 5% performance. Time to repair: 10 hours. Cost: 40%
116 – 119	Unit disabled. −100 to maneuvers / 5% performance. Time to repair: 12 hours. Cost: 50%
120	Unit destroyed. Time to replace: 12 hours. Cost: 100%

THE MANEUVER TABLE

Total Roll	Maneuver Results		Spell/Psi Results	
	Percentage	Bonus	RR	Utility
(-51) Down	Fail	-70	Fail	Fail
(-50) – (-31)	Fail	-65	Fail	Fail
(-30) – (-10)	Fail	-60	Fail	Fail
(-10) – (-01)	Fail	-55	Fail	Fail
0 – 10	Fumble*	-50	Fumble*	Fumble*
11 – 20	10	-45	65	Fail
21 – 30	20	-40	70	Fail
31 – 40	30	-35	75	Fail
41 – 50	40	-30	80	Fail
51 – 60	50	-25	85	Fail
61 – 70	60	-20	90	Fail
71 – 80	70	-15	95	Normal
81 – 90	80	-10	100	Normal
91 – 100	90	-5	110	Normal
101 – 110	100	+5	120	Normal
111 –130	110	+10	130	Normal
131 – 150	120	+20	140	Normal
151 – 170	130	+30	160	Double
171 – 200	140	+40	180	Double
201 – 230	150	+50	200	Double x2
231 – 260	160	+60	220	Double x2
261 – 300	170	+70	240	Triple
301+	180	+80	260	Triple

Modifiers

Mundane:	No roll required
Routine:	+60
Easy:	+40
Light:	+20
Medium:	+0
Hard:	-20
Very Hard:	-40
Extremely Hard:	-60
Sheer Folly:	-80
Absurd:	-100

* = Fumbles only occur on an unmodified roll of 01– 05 for everything except weapon use. Otherwise, treat the results as a normal failure.

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