

2300AD

TOOLS FOR FRONTIER LIVING



TRAVELLER®

2300AD

HUMANITY DISCOVERS THE STARS

TOOLS FOR FRONTIER LIVING

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TRAVELLER INNER CIRCLE

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INTRODUCTION

Of all the worlds humanity has touched on in its exploration of the cosmos, few have been hospitable. While many worlds support their own biospheres and can, to a degree, sustain terrestrial life, the worlds themselves are not friendly to humanity. Earth, even with its tigers, viruses and venomous spiders, is still a more welcoming place than any world on the Frontier by far. Yet humanity perseveres in its attempts to either tame these new worlds or adapt to them.

Humanity is a tool-using creature and this book presents a variety of *Tools for Frontier Living*. From survival gear to luxuries Travellers use to reward themselves, this book covers the gamut of technology available across the many worlds of the Frontier, through all three Arms and the worlds and stations in between.

LIFE ON THE FRONTIER

There is very little in the way of common experiences from one colony world to another. The key similarity, however, is the need for self-reliance. Whether help is five light years away or just a few hours, in an emergency the only people you can count on is yourself and those close to you.

Colony life emphasises the practical, the useful and the robust. Link phones, for example, are common on Frontier worlds where there is network coverage but bear little resemblance to the high-tech marvels from the Core. While newer phones will work on a colonial network, half of their advanced functions will not, due to a lack of support, and the first time in a dust storm will likely be the last time they ever work. Simple and tough is the key.

Many Core commentators say the same adjectives apply to colonists; simple and tough. They are half-right. Tough is important. Simple, however, is a failing colonists cannot afford. Colonising a new world is hard work, not just physically but mentally as well. A farmer on Beowulf has to be able to adapt to harsh

conditions and short growing seasons, experimenting with crops, working with agronomists and soil scientists, and as well as defending their crops and livestock from dracoforms and other hostile denizens of that harsh and unforgiving world. Any farmer is as much technician as anything else, with many practical scientists as well.

On the Frontier, there is always more work than people. A skilled worker has their pick of employment and many vital projects languish for lack of personnel. Emigration from the Core is low as most people are far too comfortable to leave its safety and security, even if half of them are unemployed. They still have Basic, which provides food, a home and Link access, with a small stipend to permit the occasional luxury. On the Frontier, however, outside of some very large cities, Basic does not exist. It is sink or swim. Most people who emigrate to a colony think of themselves as 'swimmers'. Most of them are correct.

There is the persistent view that colonists tend to be more conservative in mindset than those who stay in the Core. While emphasis on self-reliance and the general lack of social programmes (aside from medical care) may support this notion, most on the Frontier are very open-minded about how people live their lives. As long as no one is being hurt and everyone provides informed consent, few care. Group families are common on many worlds, especially on very harsh ones like Hermes or Cold Mountain. Aside from revanchist religious groups, there is a general acceptance of what were once termed 'alternative lifestyles'. Sexual and gender identity, or lack thereof, are largely irrelevant, both in the Core and on the Frontier. Marriage tends to be for limited terms, typically five to ten years, and while some choose to renew their contracts, many do not. Even on the Frontier, people live a very long time and they change, grow and sometimes diverge.

One of the few groups that tends to be subject to discrimination are those with DNA modifications. While they are generally accepted on their homeworlds, there is a strong sentiment against human modification in the

Core and this is reflected in the views of many non-Libertine starship crews and incoming new colonists. Fewer and fewer new colonists are electing to receive the DNAM available for their colonies of choice, instead preferring to ‘preserve their humanity’. While this has not led to conflict as yet, it has created two groups within these colonies, as the Hard Path and Soft Path move increasingly further apart.

Space-faring cultures of human space put more stress on assistance but still require self-reliance or at least capability. These cultures, like the Belters and Libertines, more resemble extended families than most colonies. There are far fewer of them, so they are always ready to help out one of their own. While most colonists, in particular those on less-supported worlds, view Libertines as friends and allies, there is still distance between them. The growing divide between the Hard Path and the Soft Path will impact relations with the spaceborn too, as the vast majority have inherited DNAMs, typically some variety of Freefall. There has been talk of emulating the Sooners and leaving the bounds of human space for further worlds, where the Soft Path can grow and adapt.

Whether they are Soft Path or Hard Path, the rate of population growth is far higher on colony worlds than in the Core. Most colonial governments provide reproduction incentives in the form of land grants, tax cuts or outright cash giveaways. However, as colonies mature and become more urbanised, birth rates decrease regardless of incentives available. In general, the first two generations of any new colony experience growth rates of 2% or higher, with populations doubling in the first few decades of settlement.

Fashions and entertainments of the Core tend to make their way out to the colonies but between travel times and different rates of adoption, colonies will always seem behind the times to visitors from the Core. The more outrageous and impractical fashions often fail to find purchase on colonies at all, where practicality reigns supreme. Visitors will also find that the farther out colonies are, the less they care about the latest and greatest from the Core and the more likely they are to prefer local fashion and entertainment. Most new colonies do not have the manpower for professional entertainers, so performers are generally amateurs who act or play music on their own time once work is done. In a similar vein, newer colonies do not have professional athletes but

enthusiastic amateurs are easy to find. The games played are ones that do not require much in the way of equipment or facilities, so baseball, soccer, basketball, lacrosse and cricket are popular. Team sports are particularly important and widely encouraged. Not only does playing a sport let someone blow off steam, it fosters team-building. This is even more important for the children of the colony and many resent the fate that brought them so far from ‘everything interesting’, so team-building is part of the toolbox that can be employed to make them focus on friends and the welfare of the community.

There are exceptions to these generalities. The rigid hierarchy of survival on Cold Mountain, for instance, where people conform or die, or the relaxed attitudes of Dunkelheim to most victimless crimes are outside the norm for the Frontier. Colonies grow, change and adapt to local conditions, and in doing so develop their own unique societies. Some sociologists have described colonisation as a vast experiment, which is even now bearing some fascinating fruit.

Availability of Goods and Services

At the Referee’s discretion, some items and services may not always be available on every Frontier world. To determine if a good or service is available, make an Average (8+) Broker check (1D hours, INT). Effect 5+ means there is a surplus and the item is available at book price. Otherwise, success indicates it is available, and subject to the Cost Modifiers table.

If an item or service is not available at the colony’s Law Level, then either special permits are required or the Travellers must turn to the shadow market. This requires a Difficult (10+) Streetwise check (3D hours, INT). If the check is failed with Effect -4 or worse, the Travellers’ activities attract the interest of local law enforcement or perhaps even national military forces, depending on the nature of the item being sought.

A colony’s Tech Level is an indicator not only of the local manufacturing capability but of their relative economic strength and ability to import goods from off-world. This affects the cost of items as well. Each point of Tech Level the item is above the colony’s Tech Level imparts a penalty on availability and increases the cost.

Cost Modifiers

Difference	Availability DM	Cost Modifier
1	-1	1D x 1%
2	-2	1D x 2%
3	-3	1D x 5%
4	-4	1D x 10%

Military Equipment

Military grade equipment, weapons and vehicles have an additional DM-2 to checks for availability and DM+1 to the dice roll of the cost modifier.

Tier Levels

The Tier level of the home nation of the colony also has an impact on cost and availability of equipment. In general, the higher the Tier, the better the availability of tools, weapons, vehicles and other equipment.

Tier Level	Availability DM	Cost Modifier
1	+1	-1
2	+0	+0
3	-1	+1
4	-2	+2

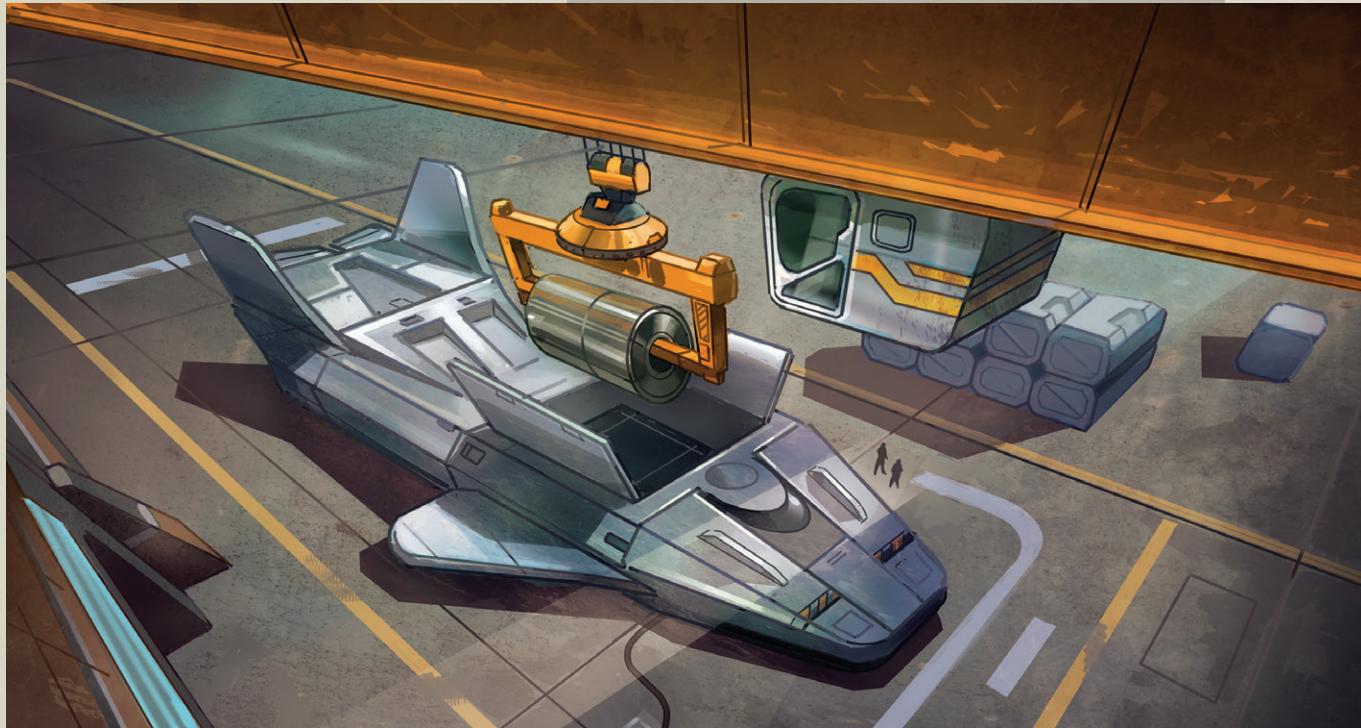
Manchuria

Manchurian colonies are notorious for being under-supported, despite Manchuria's status as a Tier 2 nation. These colonies have the same availability and cost modifiers as a Tier 4 colony. Manchurian colonies strive for self-reliance as much as possible.

Pentapod Biotech

For Pentapod biotech, DM-2 is applied for worlds on the French Arm, DM-4 for worlds on the American Arm and DM-6 for worlds on the Manchurian Arm. Pentapod biotech is not permitted in the Core at all.

For example, Kanata, a Canadian colony on the Manchurian Arm, is TL8. Canada is a Tier 3 nation. A Traveller is looking to purchase a Heliodyne Drone, which is TL11. With a difference of 3 between Kanata's TL8 and the drone's TL11, DM-3 is applied to the availability check. As Canada is a Tier 3 nation, there is a further DM-1, for a total DM-4.



SPACE TECHNOLOGIES

A wide range of technological innovations have granted humanity the ability to live and work in space, with a level of comfort, safety and cost-effectiveness undreamt of in the last years before Twilight closed that chapter of history.

RETURN TO SPACE

After the Ikarus mission in 2089, humanity began to return to space. With the devastation of so much planetary infrastructure over the course of Twilight, especially telecommunications, this return to space was focused on industrialising both low and geosynchronous orbits. Raw materials for this expansion came from the Moon and then later from redirected near-Earth Objects (NEOs), asteroids that closely (in astronomical terms) approached Earth. 2075 NM2197 is the most famous of these objects but others formed the basis for a new space-based industrial revolution.

Asteroid mining was, and is, the most cost-effective way of securing certain resources. With much of Earth's manufacturing capability rebuilt in orbit,

space-based resource extraction made even more sense. All of this industry in space and the need for workers to support, maintain and build these facilities drove almost all technological innovation over the next 200 years. All aspects of life in space, from drive systems to life support to spacesuits and habitats have moved far beyond the specialised and practically hand-built technology of pre-Twilight times, and into practical maturity.

While space is still a hostile and dangerous place, advancements in technology have opened it up to the extent that even a person with average resources can get into space and find work there.

The chapters in this section deal with suits and equipment commonly available on the Frontier. In many ways, the equipment here is more advanced or at least equal but more robust, than similar technologies available in the Core. This equipment is of critical importance and all who work in space know the importance of cleanliness and exacting maintenance of the equipment that keeps them alive.

SPACE EQUIPMENT

Humanity has been living and working in space for 200 years and over that time innovators, engineers and scientists have developed and improved many new technologies. The most important are those that protect people, from spacesuits, to long-term life support, radiation protection and ways to adapt to low or no gravity.

Standard Items

There are two basic problems with working in the vacuum of space. The first is the need for life support and the second is the difficulty in moving about. Each of the following items has been designed to solve one or another of these problems.

Buddy

Buddy is designed as a children's companion and can be carried or worn as a backpack. Buddies are available in several variants, such as a stuffed dragon, bear, doll or any number of other formats. All have the same core, however. A Buddy is a voice-activated nanocomp equipped with a comm system, tracker, small gas-jet system, beacon and small Expert system to help the child. Many children grow very attached to their Buddies and the Buddies develop a sort of personality over time. Since Buddies have a computer and are networked, children often use them as a way



Buddy

to keep in touch with friends, even those on planets or stations far away. These networks are very safe, with the Buddies themselves providing a layer of security.

Item	TL	Kg	Cost
Buddy	10	2	Lv200

Emergency Docking Tunnel

The EDT is used to connect two spacecraft with functioning airlocks to allow shirt-sleeve transfer of crew, supplies and casualties. It is also possible to connect the tunnel to any suitable area of hull and burn in. Each inflatable tunnel section is 10 metres long and 2.5 metres in diameter.

Item	TL	Kg	Cost
Emergency Docking Tunnel	9	50/section	Lv1000/section

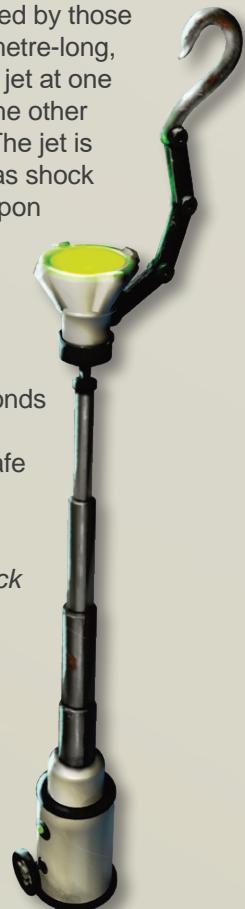
EVA Stick ('Broomstick')

An EVA stick is a very common item used by those working in vacuum and zero-G. It is a metre-long, telescoping rod with a compressed gas jet at one end, a hook and magnetic grapple on the other end and a gas shock absorber inside. The jet is used to manoeuvre in space and the gas shock absorber is used to slow the operator upon approaching a surface. A valve within the tool can be triggered to prevent the shock absorber from re-extending until the operator desires. The gas jet has a continuous duration of three minutes; normal use consumes about three seconds of propellant per manoeuvre. Since the EVA stick uses compressed gas, it is safe to use within habitats.

Gas-jet Pistol



EVA stick





Item	TL	Kg	Cost
EVA Stick	9	4	Lv750

External Repair Bay

Performing repairs on the outside of spacecraft is much more difficult and dangerous than inside, largely due to the possibility of rupturing a vacc suit. For this reason, the British firm of Gorman Systems Ltd. has designed a portable external repair bay. The bay comprises modular sections that attach together on a ship's hull using magnets or gekkocott, creating a 10 x 10 x 2 metres space that can be flooded with atmosphere, allowing unsuited personnel to work on the outer hull of the ship.

Item	TL	Kg	Cost
External Repair Bay	10	800	Lv8000

Gas-Jet Pistol

The gas-jet pistol uses either compressed air for use inside habitats or else compressed nitrogen or carbon dioxide for use in vacuum.

It is designed to fire short bursts of propellant; it takes a bit of tinkering to rig them to spray longer bursts or empty the gas cartridge all at once. Each short burst can increase or decrease the user's speed by one metre/round. Using the pistol requires a Routine (6+ DEX check (1D seconds).

Item	TL	Kg	Cost
Gas Jet Pistol	9	1	Lv50

Magnetic Grappler

This device is a squat cylinder (five centimetres high by 10 centimetres in diameter) containing a battery-powered electromagnet for attachment to ferrous metals, such as ship hulls. One face attaches to the metal surface; the other has a lock ring through which to run a safety line for work in zero-G. The battery is good for 12 hours of constant operation. The magnetic grappler will hold up to 250 kilograms.

Item	TL	Kg	Cost
Magnetic Grappler	9	0.5	Lv150



Magnetic Grappler

Pal

A Pal is the adult version of the Buddy. Instead of a plush toy/backpack, Pals are floating balls fitted with a small gas jet, touch screen and like the Buddy, they are voice-activated. They have handstraps on either side and a pull-out shoulder strap to use when under gravity. The Pal is equipped with a nanocomp, battery and a compressor with a storage tank. It moves around with puffs of compressed air and with the handles it can pull someone through a station until they reach their destination. They are not common among older Spacers but any visitor to a station is often provided with one. Young people moving on from a Buddy have begun transferring their data and the pseudo personality of the Buddy to a Pal, and there is some concern among the older generation of Spacers that young people starting out now are too reliant on their devices and the networks built up around them.

Item	TL	Kg	Cost
Pal	11	3	Lv500

Rocket Stake

A rocket stake is used to attach zero-G safety lines to surfaces that magnetic grapplers and gekkocott cannot adhere to, such as the rocky surfaces of small asteroids. Each rocket stake is 20 centimetres long x 5 centimetres in diameter and comes with a recoilless pistol-grip firing mechanism (care must be taken to avoid the stake's backblast area) and a 100-metre reel of safety line.

If used as a weapon, the rocket stake has an effective range of four metres, does 1D damage and suffers DM-2 on attack rolls.

Item	TL	Kg	Cost
Rocket Stake	9	5	Lv500



Pal

Zero Gravity Toolkit

Without gravity to act as an anchor and help provide counter-torque, many otherwise normal hand tools become very awkward to use in space. The mechanical toolkit for zero gravity operation provides an array of powered and unpowered tools designed to provide counter-torque to allow maintenance personnel to work in space. The mainstay of the toolkit is the pistol grip tool, a refined and more versatile version of the same tool used in the construction of the first International Space Station in the years before Twilight. It is essentially a variable speed/torque drill with counter-torque capabilities to keep the user from spinning in zero-G. The toolkit contains a variety of attachments for the pistol grip, including various drills, saws and socket wrenches. A set of wrenches are kept in the kit as well, with a counter-torque mount on them to make them more usable.

The toolkit provides DM+2 to Mechanic checks as appropriate.

Item	TL	Kg	Cost
Zero Gravity Toolkit	10	8	Lv1500

Znachok (fr. Russian: Badge)

Everyone in a station or habitat is expected to wear a znachok at all times. This badge is a combination of a dosimeter, air pressure monitor and carbon dioxide alarm. All znachok have the ability to upload information via wireless networks to authorised terminals. In many stations, the znachok is also a locator, allowing the wearer to be tracked.

The znachok is often worn at the belt or around the neck and works best if placed outside of clothing.

Item	TL	Kg	Cost
Znachok	10	—	Lv40



Znachok

SPACE EMERGENCY AND RESCUE EQUIPMENT

Space is a dangerous place, even with all the advances made over the past 200 years. Emergency and rescue equipment is available in ship's lockers and emergency lockers. Each stateroom should also have an emergency kit.

Clamp-on Airlock

Sometimes called a breaching lock, this unit is used in situations where a normal airlock cannot be used and a hull must be breached quickly without jeopardising the integrity of its interior atmosphere. In such cases, a clamp-on airlock can be handy. It attaches to the outside of a hull by means of magnetic pads, chemical adhesives or electrical spot welds (depending upon hull material), allowing a hole to be cut through the hull for access to the interior of the ship. If a clamp-on airlock is to be used for more than several minutes, it is usually welded in place permanently. It is often used with emergency docking tunnels.

Item	TL	Kg	Cost
Clamp-On Airlock	9	2,000	Lv30000

Cutter/Spreader (Zero-G)

This is a specialised version of a conventional cutter/spreader adapted for zero-gravity work. It has heavy anchoring pads that stabilise the action of the cutter/spreaders. The electromagnetic jaws can shear through 10 centimetres of armoured composite material, while the spreader can force open even badly buckled doors and hatches. The device is too slow and bulky to be used as a weapon.

Use of the cutter/spreader will add DM+2 to attempts to free people or equipment trapped in wrecked areas of a ship or station.

Item	TL	Kg	Cost
Cutter/Spreader (Zero-G)	10	30	Lv15000

Emergency Kit

At the beginning of a voyage, crew will instruct all passengers and supplementary personnel in the use of emergency kits. Each stateroom and common area should have a supply of kits, enough to provide double coverage for the crew and passengers. Each

Cutter/spreader



kit contains a basic first aid kit, oxygen mask and air bottle, emergency rations, flashlight, earpiece comm-unit in a sealed package and rescue ball.

Item	TL	Kg	Cost
Emergency Kit	10	8	Lv1000

Emergency Patches

Starship hulls are equipped with self-sealing systems, protecting occupants from minor penetrating impacts. For larger breaches, an emergency patch is used. These can typically be found in a ship's locker, although each room and passage should have a case of them. Each patch is a square of carbon-fibre composite, with a peel-off backing to expose the gekkocott gel. This side is placed against the breach and seals the hull, expanding into and hardening in the breach. Most patch kits have a pressurised can of sealant as well, in case the patch does not seal completely.

Most patch kits will have a small assortment of patches. It will have patches of 10 x 10 centimetres, 30 x 30 centimetres, and 50 x 50 centimetres.

Item	TL	Kg	Cost
Emergency Patches	10	800	Lv8000

Emergency Re-entry Kit

Originally designed as survival equipment for spacecraft crippled in low orbit, the ERK is now also used in the extreme sport of orbital diving. The ERK can only be used on worlds with a thin atmosphere or thicker, as it relies on the atmosphere for braking and parachutes for the final landing phases.

The ERK consists of a foamed ablative shield that a Traveller creates using a can of high-density foam and a mould around their spacesuit. The process is largely automatic. A small chemical thruster is used for the de-orbit burn, which takes an amount of time equal to the world's Size x 3D minutes before the ERK enters the atmosphere. The ERK and wearer will be on the opposite side of the world from where they started by this time.

The re-entry phase of the operation sees the ablative foam slowly burnt off the suit, never putting the user at risk. This phase requires a Routine (8+) Vacc Suit check (DEX). A negative Effect is added in minutes to the duration of the re-entry phase. Effect -6 or worse requires an immediate Difficult (10+) Vacc Suit check (DEX). Failure here results in a re-entry accident where the wearer of the ERK is killed.

Once the re-entry phase is complete, the remnants of the heat shield are jettisoned and the wearer free-falls from approximately 50 kilometres. At 30 kilometres, a drogue chute deploys to slow the rate of descent and at five kilometres the main chute (usually a parawing) will deploy.

Item	TL	Kg	Cost
Emergency Re-entry Kit	11	50	Lv15000

Emergency Suit

A step up from a rescue ball, the emergency suit provides very limited mobility. It is a brightly-coloured synthetic material pulled on like a set of overalls. The soft helmet and suit automatically seal, and the suit is inflated. Even at the low pressure of the interior of the suit, it is still very difficult to move it. All physical actions suffer DM-2.



Rescue Ball

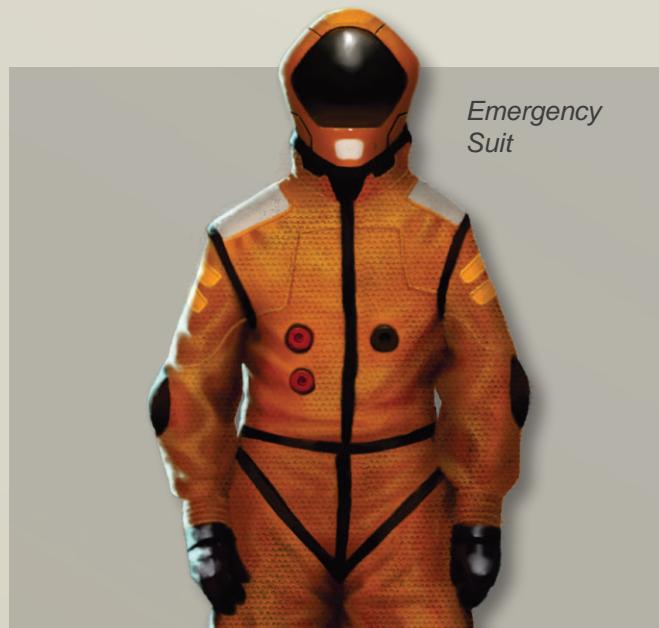
The emergency suit has a built-in 20-minute air supply, radio transceiver and visible light/radio beacon. It has an external connection for a PLSS-A system (see page 23) in a carry case. Many ships will provide PLSS-A kits in the same emergency locker as the suit.

Item	TL	Kg	Cost
Emergency Suit	10	8	Lv1800

Rescue Ball

The rescue ball is a 1.5 metre diameter inflatable ball. The user opens up the ball from its packaging, climbs inside and inflates it. The included air supply/recycler provides six hours of life support and will maintain the occupant for another three hours, unconscious, before it runs out of breathable air. Rescue balls are equipped with rescue beacons. On civilian ships, these beacons are automatic and cannot be shut off. On military vessels, these beacons are set to go off automatically upon inflation but can be controlled manually.

Item	TL	Kg	Cost
Rescue Ball	11	4	Lv500



BEACONS

There are several types of beacon used aboard spacecraft and in space. All are designed to be simple to use and, where possible, tamper-proof. Most cannot be turned off once activated, save by authorised personnel.

Claims Beacon

A claims beacon is attached to an asteroid or other object. It broadcasts a continuous, high-powered signal with the ID code of the bank or insurance company that underwrites the beacon, along with a pre-recorded message stating the nature of the claim, the claim file number and who the underwriter is. Claims beacons are made from very tough composite material and are difficult to damage.

Item	TL	Kg	Cost
Claims Beacon	10	20	Lv800

Rescue Beacon

A rescue beacon is standard equipment on most spacesuits, life boats and rescue balls. Once activated, it broadcasts a continuous signal for 144 hours, and blinks a brilliant white light. This grants DM+4 to all

attempts to locate it. In civilian usage, the beacon cannot be turned off once turned on but military beacons are manually operable.

Item	TL	Kg	Cost
Rescue Beacon	9	1	Lv50

Warning Beacon

Warning beacons are used by governments and other agencies, and attached to dangerous or restricted objects. The warning beacon emits an extremely bright pulse of visible light, along with a multi-frequency radio warning to stay away. A Link or data channel is usually provided to give more information on the nature of the warning.

These beacons are squat, armoured cylinders, about one metre tall and 50 centimetres wide. The hemispherical top is the light emitter, with the radio, computer and power supply. The power supply is good for six months and can be supplemented by solar panels.

Item	TL	Kg	Cost
Warning Beacon	10	100	Lv10000

Warning Beacon



Claims Beacon



Rescue Beacon



SATELLITES

Satellites are generally placed in orbit by ships already around a world. They can also be launched by relatively inexpensive disposable rockets, which most colony worlds can manufacture. If there is more than one colony on a world, they will often co-operate and share satellite resources.

Communication Satellite

This is a solar-powered orbital receiver and re-transmitter of tight beam or broadcast communications in a stationary equatorial orbit. Each provides 20% coverage of a world, so five satellites evenly spaced in the same orbit will provide 100% coverage.

Item	TL	Kg	Cost
Communications Satellite	10	200	Lv50000

Down-Link Navigation Receiver

A down-link navigation receiver is a portable unit used by ground parties to receive broadcasts from navigation satellites. This is built-in to most Link phones, although some reprogramming may be necessary to receive signals from a private satellite.

Item	TL	Kg	Cost
Downlink Nav Receiver	10	0.5	Lv530

Navigation Satellite

A navigation satellite is a solar-powered orbital broadcast transmitter. Five satellites are required to provide full coverage of a planetary surface. Each satellite continuously broadcasts its identification code and current position so a down-link receiver and microprocessor, either in a Link phone or as a discrete device, can establish its surface location to within 50 centimetres.

Item	TL	Kg	Cost
Navigation Satellite	10	100	Lv50000



Surveillance Satellite

A surveillance satellite is a solar-powered, low orbit satellite. Each satellite will orbit an Earth-sized planet roughly three times a day and scan the area directly below and 50 kilometres to either side. This common class of surveillance satellite has an optical resolution of 0.2 centimetres on a clear day.

Item	TL	Kg	Cost
Surveillance Satellite	12	150	MLv1.5

Survey Satellite

A survey satellite is a solar-powered photographic satellite for mapping a planet and collecting meteorological data, placed in geosynchronous orbit to provide surface mapping and data on atmospheric weather conditions. Resolution of a survey satellite is approximately 50 centimetres.

Item	TL	Kg	Cost
Survey Satellite	10	50	Lv250000

Weather Satellite

Weathersats are small, solar-powered satellites intended to provide detailed meteorological information for the world below. Purpose-built for weather monitoring, it lacks the resolution required for surface mapping. On occasion, however, these satellites have been rigged for such duties, often through software tricks to use it as a make-shift optical interferometry telescope. It usually inhabits a low polar orbit, passing over the entire globe in the course of many orbits.

Item	TL	Kg	Cost
Weather Satellite	10	20	Lv100000

SPACESUITS

Spacesuits have been in use for over 350 years and in that time they have undergone considerable changes and improvements. Despite that, the basics of suit design have remained largely unchanged. They are designed to protect their wearers from space, from the vacuum, lack of air, radiation and other hazards. While there are off-the-shelf spacesuits (derisively referred to as 'baggies' by most spacers), anyone who spends time in space as part of their profession will eventually purchase a bespoke suit. Pilots may get a skinsuit, while deep-riggers will get a customised worksuit with a hardshell torso and high-end entertainment system that is practically a ship in itself.

STANDARD EQUIPMENT

All suits, including baggies and tourist suits have standard safety and comfort equipment. All suits are equipped with helmet-mounted lights, video camera, a radio transceiver and emergency locator beacons. Helmets also include an anti-glare polarized visor to protect the eyes and skin of the user, a small status display, typically in the upper right or left of the visor, and a small water bottle for comfort.

SUIT TYPES

There are three general categories of spacesuit: skinsuits, softsuits and hardsuits. Each can be customised to a greater or lesser degree.

In the description for each spacesuit there is an entry for upgrade slots. The number of upgrade slots cannot be increased. These upgrade slots can be used to add additional equipment or upgrades to the suit.

Custom fitted suits are available for any of the designs listed and many more, for roughly 50% more. A fitted suit takes less time to put on, is more comfortable and as it is custom-made, comes with the peace of mind that no one else has ever worn it.

Skinsuits

A skinsuit is, as the name implies, a skin-tight pressure suit. It is made from fabric constructed from layers of adaptive memory plastics and myomer controlled by an onboard nanocomp. These materials 'learn' the movements of their wearer and can expand or contract the material in anticipation of enough to keep soft tissues from expanding in a vacuum. The inner layer of the material is designed to wick away moisture as part of the suit's thermal regulation system. If the wearer expects to spend any time in vacuum, the skin suit is often combined with an outer layer of coveralls that provide improved protection and proper thermal regulation.

As the memory plastics can just relax to loosen the suit, it is no more difficult to put on than a full set of long underwear. Once it is on, the weave tightens up to provide proper support.

Life support is provided by a small belt-pack life support system, good for about 30 minutes, which is connected to a soft bubble helmet that inflates when attached to the life support unit. Although these suits are easy to put on and take off, some wearers, especially long-haul Belters, choose to leave them on constantly. This creates problems in terms of waste elimination, as skinsuits are not equipped to deal with waste, either solid or liquid.

Baxtalo Free Flight Textiles 'Binak' (twin) Skin Suit

Baxtalo Free Flight Textiles is a Libertine family corporation on Baxtalo Station in the Chengdu system. They are the supplier of choice for spacesuits for Libertine trader families. The Binak skinsuit is found throughout the Libertine families and Belters on the Manchurian Arm strive to purchase these suits, making almost a pilgrimage to Baxtalo to order one.

The Binak is worn by all adult Libertines when they are on duty and sometimes when they are not. Over time, the suit becomes something of a second skin and

is decorated and modified to suit the wearer as they grow and change. Although it has a good reputation, its quality is representative of commercial skinsuits.

The Binak does not have any special features installed at time of purchase.

M90 Aerospace Crew Environment Suit

Both the USAF and the ASF used these suits, developed by the National Aerospace Bureau and built under contract with the Trilon Smart Textiles division. The M90 is lightweight and flexible, exactly what a pilot needs for aerospace and fighter craft. Unlike most skinsuits, the ACES sports some armour protection.

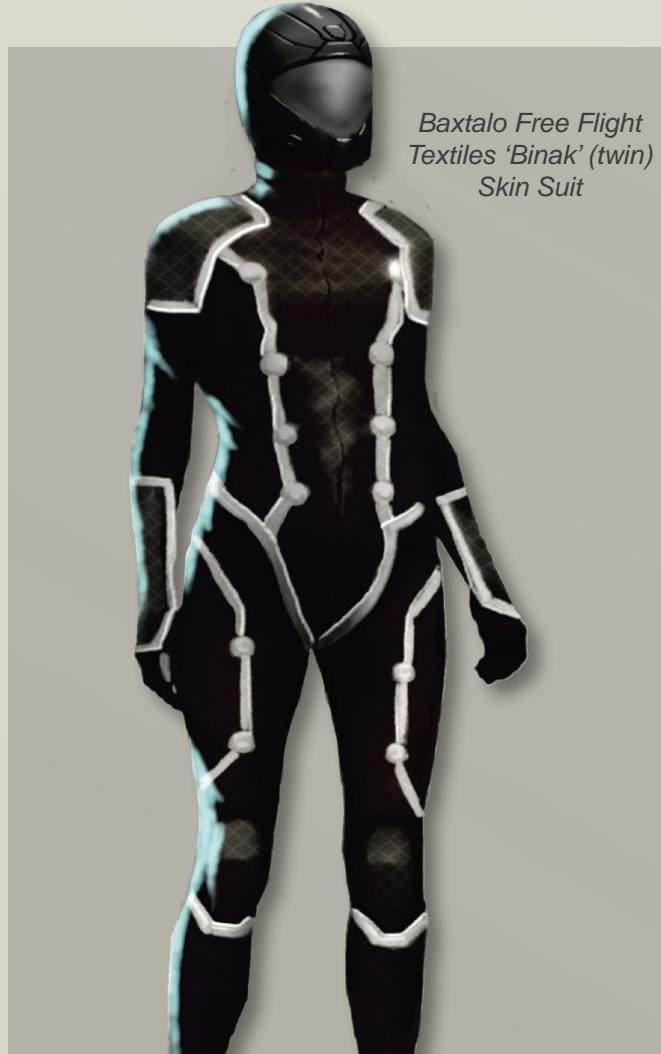
The M90 is equipped with geckotoe boots, a 50 kilometre radio transceiver, HUD display, water bottle and pill dispenser. The helmet also features an interface connection to allow the pilot to connect to an aerospace craft or fighter with a neural interface. For long-range missions, the pilot or crew is expected to wear a MAG (Maximum Absorbency Garment).

Vannoccio LX5000 Aether Suit

Extremely lightweight and made to exacting order by the finest automills in Italy, the LX5000 'Aether Suit' is a highly personalised and customised suit made individually for each buyer. Despite that, they somehow all manage to look nearly the same. Cosmetically there are differences: the trim, suit decorations, light panels, but they all have the same 'look and feel'. Even given what the buyers pay for them, few of them see fit to complain.

The Aether Suit has been described as the most comfortable environment suit ever made. While one of these suits can compensate for minor weight and size changes in the wearer, they are so tightly-fitted that they cannot be worn by anyone else. It comes fitted with a custom PLSS unit to avoid spoiling the lines of the suit, which can hold a single Ultra-high Pressure (UHP) air bottle of up to two kilograms. A two kilograms UHP bottle should provide up to six hours at normal exertion rates.

The Aether Suit is equipped with a 50 kilometre range radio transceiver, water bottle, HUD display and boosted myomers. This allows the wearer to add +1 to either Strength or Endurance. As the suit lacks exo-skeletal support, any more of a boost risks injury to the wearer.



*Baxtalo Free Flight
Textiles 'Binak' (twin)
Skin Suit*

Suit Type	Protection	TL	Rad	Kg	Cost	Required Skill	Upgrade Slots
Aether Suit	0	11	10	2	Lv25000	Vacc Suit 0	2
Binak	0	10	10	5	Lv8000	Vacc Suit 0	1
M90 ACES	+2	12	25	3	Lv9000	Vacc Suit 0	0

*M90 Aerospace
Crew Environment
Suit*



*Vannoccio LX5000
Aether Suit*



Softsuits

A softsuit is what most people think of when they think about spacesuits. They are the most common type of suit used for short- to medium-duration vacuum exposure and are the direct descendants of the suits used by the Apollo crews who originally explored Earth's moon.

A softsuit consists of multiple layers for the comfort and protection of the occupant. The wearer first puts on the inner suit, which consists of a personal bodysuit and then the cooling and ventilation layer. Over this combination goes the outer suit. The outer suit has three layers. The first is the liner, which contains the atmospheric mix in the suit. Next to the liner is the restraint layer, which maintains internal pressure and shape and contains the highly flexible joints required for proper movement. The final layer is a woven composite designed to protect from hyper-velocity impacts and radiation, including thermal radiation.

A softsuit can use any of the PLSS options listed later. It comes equipped with a heating/cooling layer, the pressure suit itself and an outer layer of armour cloth

as protection against micro-meteoroid strikes. The helmet is the classic goldfish bowl with an armour cloth cover over it.

Softsuits do not have to be custom-made but for full effectiveness they should be. The same memory plastics used in skinsuits are used in commercial softsuits (baggies) to allow some custom fitting of a stock suit.

Softsuits take at least five minutes to put on while baggies take twice that. Under normal circumstances, with a partner to assist, no roll is required. Under stress, however, an Average (8+) Vacc suit check (dexterity, 2D minutes) is required to put one on. Having a partner to assist and check your connections grants a DM+2. On a failure, the Effect is added to the time required, in minutes. This time is doubled for a baggie.

Gorman r7 Excursion Suit

One of the more popular 'baggie' style suits, the r7 is a common item available for rent or purchase across the frontier. Often the first suit of an unwary buyer, anyone who uses an r7 for an extended period of time



learns better and trades up to a bespoke suit as soon as possible. The r7 is also popular on starships as an emergency suit and at many destinations as a rental suit for tourists.

The r7 is a basic TL10 baggie with minimal electronics. The only other features are a dispensary for headache and anti-nausea medications, and a bottle of water; scratching an itch in a baggie is not possible. It is normally equipped and sold with a LifeCorp a80 PLSS C, which has space for two air bottles, usually a four-hour primary and a two-hour backup. For tourist use, it is usually only equipped with the primary air bottle.

The Gorman r7 does not have any special features installed.

Suit Lock

A suit lock has the suit's entry point in the back through a hatch and torso extension. This makes entry and exit from the suit extremely quick and easy. The suit is often external to the spacecraft or station, making decontamination not an issue. The operator enters the suit from within the ship or station, and the suit's external lock closes. Then a pack containing the PLSS is swung into place, the internal hatch closes and the suit detaches from the vehicle or station. This is commonly used for planetary suits, especially on worlds with an active biosphere.

Suit Type	Protection	TL	Rad	Kg	Cost	Required Skill	Upgrade Slots
Gorman r7	+5	10	50	1	Lv8000	Vacc Suit 0	1
PS50 Security Environment Suit	+10	11	100	9	Lv8000	Vacc Suit 1	1
Star Wanderer	+8	11	50	13	Lv8900	Vacc Suit 0	1



'Star Wanderer' Planetary Suit

The Manchurian government commissioned the Star Wanderer planetary suit in the mid-2280s to assist in the exploration effort of several small bodies in the Delta Pavonis system. It is a hybrid suit with a suit lock and is very popular with its users. It even sees good export sales, which is rare for Manchurian products.

The Star Wanderer is equipped with a Water Bottle, 50 kilometre Radio, Waste Disposal, Rigid Torso, Suit Lock.

Trilon PS50 Security Environment Suit (SES)

The SES (often pronounced 'sez', as in 'sez you') is used by Trilon security forces in orbital operations and on the surface of vacuum worlds. It is unusual as an armoured softsuit and despite Trilon's usual reputation for quality, the SES has seen many complaints and more failures than it should. So far there have not been any fatalities from the failures and Trilon engineers are trying to determine what could be the problem.

The PS50 is equipped with a rigid torso, a helmet-mounted HUD display with a nanocomp, enhanced optics, a scratchpad, a water bottle and a pill dispenser.

Hardsuits

The hardsuit is a rigid suit that maintains a constant volume of air inside, allowing free and easy movement. Unlike the softsuit, the hardsuit can be operated at the same internal air pressure as the ship or station. It is quicker to put on and remove, and the additional room in the torso makes it possible to withdraw the operator's arms completely, allowing the luxury of being able to scratch an itch or eat a sandwich. Hardsuits are used for all long-exposure activity, whether in space or on the surface of a moon, planet or other object.

The wearer first puts on an undergarment like a softsuit but without the cooling and ventilation layer. The entire suit is air-conditioned. This inner suit has padding to protect potential rub points on the body from the suit. The suit itself fits snugly, with multiple interchangeable parts to allow almost anyone to be fitted with the suit.

When militia forces must perform off-world actions, they tend to use commercially-purchased hardsuits, which have a certain amount of armour protection built in. Full military VCD (Vacuum Combat Dress) is seldom available to frontier forces.

ARI 'Horizons' Planetary Excursion Suit

The Horizons suit is a sophisticated hard suit intended for use on planetary missions on worlds with biospheres. As such, the exterior of the suit is smooth and easy to decontaminate but with the suitlock, it never has to enter a habitat or vehicle save for maintenance.

Once the operator enters the suit, air bottles are added to the inside hatch. The suit has an integral PLSS class C, which contributes to the smooth exterior lines. With the suitlock and integral PLSS, the suit is somewhat unbalanced. It uses an exo-frame to provide stability and assist balance.

The stock Horizons comes with the following features: 500 kilometre radio transceiver, sensors, enhanced optics, HUD display, pill dispenser, water bottle and half exo-frame (legs).

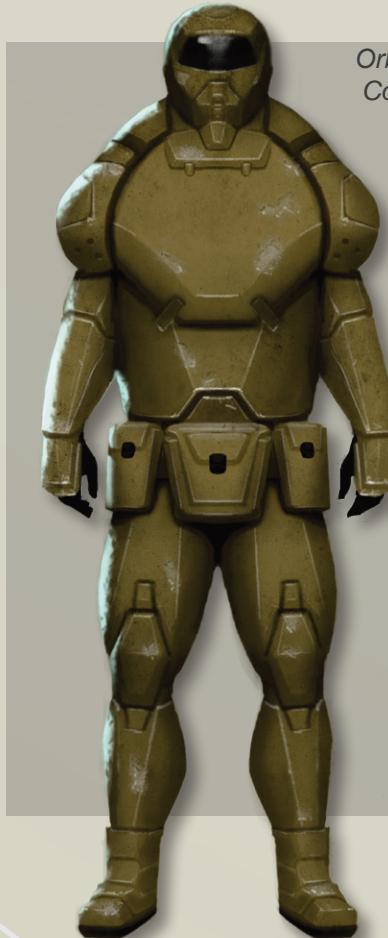
Suit Type	Protection	TL	Rad	Kg	Cost	Required Skill	Upgrade Slots
ARI Horizons	+7	11	100	9	Lv20000	Vacc Suit 1	1
DS-5 Worksuit	+8	11	150	93	Lv42,000	Vacc Suit 1	1
SS3 ORCS	+10	11	100	9	Lv8000	Vacc Suit 0	5

Pichot SS3 Orbital Repair and Construction Suit (ORCS)

The more conventional SS3 is marketed as a direct competitor to the DS-5. While it is not as capable, the addition of actual legs makes it easier to sell and for new workers to work with. The SS3 is often used by militia forces and the militaries of smaller nations as a substitute VCD suit, and its upgraded armour protection reflects that.

The stock SS3 is equipped with a 50 kilometre radio transceiver, a water bottle, pill dispenser, HUD display, and a portacomp. This increased computing power is often used for fire control for mounted weapons.

ARI 'Horizons' Planetary Excursion Suit



Pichot SS3 Orbital Repair and Construction Suit



Trilon 'Outer Reach' DS-5 Worksuit



Trilon 'Outer Reach' DS-5 Worksuit

The DS-5 is a hard shell worksuit designed for orbital construction. Most users have commented it was the most comfortable spacesuit that they have ever used. The DS-5 is not equipped with legs but it is designed with an integral manoeuvring unit, so a separate EVA pack is not necessary. DS-5s are self-contained spacecraft.

As a long-duration suit, the DS-5 is normally equipped with a Trilon Service-244, a class D PLSS, with a full load of five four-hour bottles.

The stock DS-5 is equipped with the following options: Water Bottle, Entertainment System, Mag Boots, Tool Kit, Repair Kit, 50 kilometre Radio, HUD display, Nanocomp, Waste Disposal, Sensors, Integral Manoeuvring Unit (identical to TL 12 EVA pack), Exoframe (STR +3).

SUIT UPGRADES

Electronics

All suits come with a basic five kilometre range radio and nanocomp as part of the design. Additional electronics are also available. These are added to the suit, retaining the base five kilometre radio as a backup.

COMM, HIGH POWER

Even a low-power radio can be received from across the solar system if you have an antenna big enough and sensitive enough. For normal communications, however, it is better to have a signal that is powerful enough to be received without additional equipment being required.

These comm units are dedicated voice and data with low resolution video (equivalent to pre-Twilight cable television) as a non-priority signal. Bandwidth is always limited, so often video is stored locally in the suit nanocomp rather than being transmitted.

Item	TL	Slots	Kg	Cost
Comm, 50 km	10	—	2	Lv200
Comm, 500 km	10	1	5	Lv2000

ENCRYPTION

Along with the military, other organisations, including corporations, foundations, Belters and Libertines have reason to use encrypted comms. While civilian encryption will usually fall to the latest from the TransNats and advanced military forces, it does help keep some secrets. Belters and Libertines often use cyphers, along with encryption, to safeguard secrets.

Item	TL	Slots	Kg	Cost
Encryption	10+	—	—	Lv5000

ENHANCED OPTICS

Enhanced optical systems add a retractable system that goes over the helmet and feeds information to a display inside. Some use a binocular display within the helmet or direct feeds through a neural link. The enhanced optical system include a 30x zoom function, thermal imaging and light intensification. In

addition, it has an active glare filter to protect against sunlight and other extremely bright light, including blinding lasers.

Item	TL	Slots	Kg	Cost
Enhanced Optics	10	½	1	Lv400

HUD DISPLAY

While most helmets have a small status display somewhere, a HUD adds a full data projection display to the visor. If a portacomp is also installed, the HUD can provide a full Augmented Reality experience.

Item	TL	Slots	Kg	Cost
HUD Display	10	—	1	Lv200

PORTACOMP

This is a standard portacomp integrated into the helmet electronics. Without display and input features, portacomp hardware takes up very little space. Input and output is typically by voice, although it can display limited information on a helmet's status display. If visual presentation of information is required, a HUD is typically installed along with the portacomp.

Item	TL	Slots	Kg	Cost
Portacomp	10	½	1	Lv500

SENSORS

A sensor rig is more often installed on a mission pack than a suit but either is possible. The suit sensor rig is an active/passive array similar to a vehicle sensor suite, although with a much lower range. It is uncommon for industrial suits and more common on scientific or military models. This sensor suite grants DM+1 to applicable Recon or Electronics (sensors) checks.

Item	TL	Slots	Kg	Cost
Sensors	11	2	5	Lv2000

Comfort

While these options do nothing for the actual function of the suit, they make it a great deal more comfortable for long-exposure wear.

ENTERTAINMENT SYSTEM

This is a nanocomp system with dedicated speakers and a heads-up display for video. The nanocomp, while it technically has a smaller amount of storage than a portacomp, still has effectively unlimited storage for personal files, including media. Regulations generally dictate the video portion of the system cannot be used during work periods unless it is to display instructions or schematics. In addition, it is usually against regulations to use radio bandwidth to stream audio and video in and around habitat and vacuum or asteroid mining operations, due to the limited bandwidth available for individual use.

Item	TL	Slots	Kg	Cost
Entertainment System	10	½	1	Lv120

MAG

The Maximum Absorbency Garment is little changed from the early years of crewed space flight. It is more comfortable and contains chemicals that work to neutralise, clean and encapsulate waste away from the user's skin. There are rumours that the French are testing a Pentapod construct to replace the MAG in military service.

Item	TL	Slots	Kg	Cost
MAG	10	—	0.5	Lv20

PILL DISPENSER

Ostensibly intended to dispense analgesics and anti-nausea medications, in practice these dispensers are more likely to be filled with pseudo-amphetamines or performance-enhancing drugs. Again, mining companies generally turn a blind eye to this but orbital construction companies are much more stringent, if only because they are under stricter oversight from government authorities.

Item	TL	Slots	Kg	Cost
Pill Dispenser	9	—	—	Lv20

SCRATCH PAD

A small, slightly rough pad inside a helmet that allows the wearer to scratch their nose.

Item	TL	Slots	Kg	Cost
Scratchpad	8	—	—	Lv10

STANDARD DIAPER

For short duration excursions, some Travellers elect to use a standard diaper, a protective undergarment for adult use.

Item	TL	Slots	Kg	Cost
Standard Diaper	8	—	0.25	Lv5

WASTE COLLECTION

For any excursion expected to last more than three hours, it is normal practice to use a suit with waste collection. For longer excursions, a type of heavy diaper, called the Maximum Absorbent Garment (MAG), can handle both liquid and solid waste, although can become very uncomfortable after extended use. It uses a catheter and gekkocott-fastened collection system, and is uncomfortable and unpopular. The collection system seldom functions correctly, especially in zero-gravity, and is only ever used as a last resort. This system however, is good for 12 to 24 hours.

Item	TL	Slots	Kg	Cost
Waste Collection	10	2	6	Lv600

WATER BOTTLE

While commercially-available suits all have a small water bottle, it is only 250 millilitres. This option uses a 1 litre water bottle, usually loaded with electrolytes. Some asteroid miners have been known to spike their water bottles with pseudo-amphetamines to improve response times and wakefulness on the job. While technically illegal, most mining corporations turn a blind eye.

Item	TL	Slots	Kg	Cost
Water Bottle	9	—	0.5	Lv30

Exterior Options

Exterior options attach to the outside of a suit or mission pack and provide enhanced capabilities and mobility options.

CARGO RINGS

Cargo rings are a set of D-rings attached to reinforced points on the exterior of a spacesuit, designed as attachment points for cables, equipment, or towed loads. They are not available for skinsuits. The cost reflects the need for careful work when attaching items to the exterior of a suit.

Item	TL	Slots	Kg	Cost
Cargo Rings	9	—	—	Lv1000

EXO-FRAME (FULL)

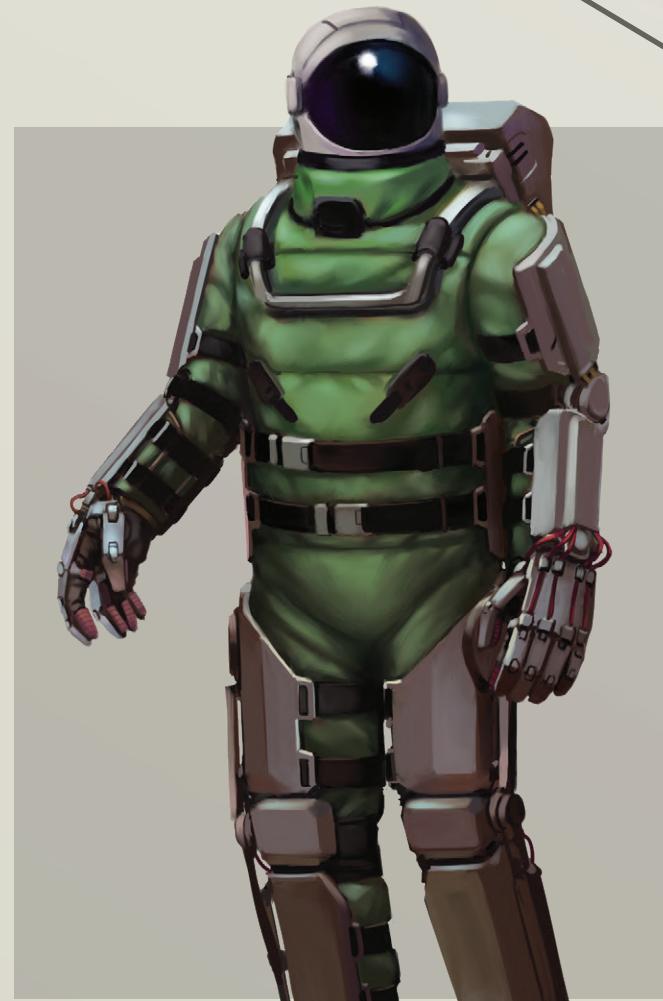
Similar to the exo-frames used in combat walkers and assistive exoskeletons, a full exo-frame is most commonly used on planetary suits and adds DM+2 to all STR-based checks. Full exo-frames can be used on softsuits and hardsuits but not skinsuits.

Item	TL	Slots	Kg	Cost
Exo-frame (full)	11	+2	50	Lv5000

EXO-FRAME (HALF)

There are two types of half frames, upper body and lower body. The upper body frame is designed to be used with hardsuits for zero-G operations, attaching to lock points on the hardsuit and assisting in shifting heavy loads in space. While material may be weightless, it is not massless and large objects still have tremendous inertia. The lower body frame is primarily for use on planetary suits and helps distribute and balance the sometimes awkward weight distribution on the surface. The upper body frame grants DM+2 to STR checks, while the lower body frame grants DM+2 to END checks.

Item	TL	Slots	Kg	Cost
Exo-frame (half)	11	+1	12	Lv3000



Exo-frame

GEKKOTOE BOOTS

Similar to mag boots, gekkotoe boots use molecular adhesion to allow them to grip any material except PTFE plastics (like Teflon), high density composites and carbon nanotube fibre.

Item	TL	Slots	Kg	Cost
Gekkotoe Boots	11	—	1	Lv5000

MAG BOOTS

Electromagnetic boots allow the wearer of the suit to walk on ferrous materials or grip them as anchor points.

Item	TL	Slots	Kg	Cost
Mag Boots	8	1	2	Lv1000

RESCUE SHELTER

In the case of an emergency with a spacesuit, the operator is supposed to deploy the rescue shelter, which inflates into two reflective foil hemispheres. The suit operator closes the shelter around them and their suit, and then pressurises the shelter. They can then exit the suit and, if possible, make repairs. If not, then they must sit and wait for rescue. The rescue shelter has the equivalent of a PLSS A with 60 minutes of air. Most safety authorities require at least half of all workers on space-based projects to carry a rescue shelter.

Item	TL	Slots	Kg	Cost
Rescue Shelter	11	—	6	Lv2000

SUIT REPAIR KIT

Self-repair capabilities are limited to very small tears. For anything larger, an emergency repair may be needed. The repair kit consists of strips, panels and patches of spun composite material, all equipped with a strong (one-ton strength) patch of gekkocott on one side. The kit also includes four tube dispensers of fast-

acting sealant that can be applied around fittings and hoses to temporarily seal them in case of a problem.

Item	TL	Slots	Kg	Cost
Suit Repair kit	10	—	2	Lv3000

TOOL KIT

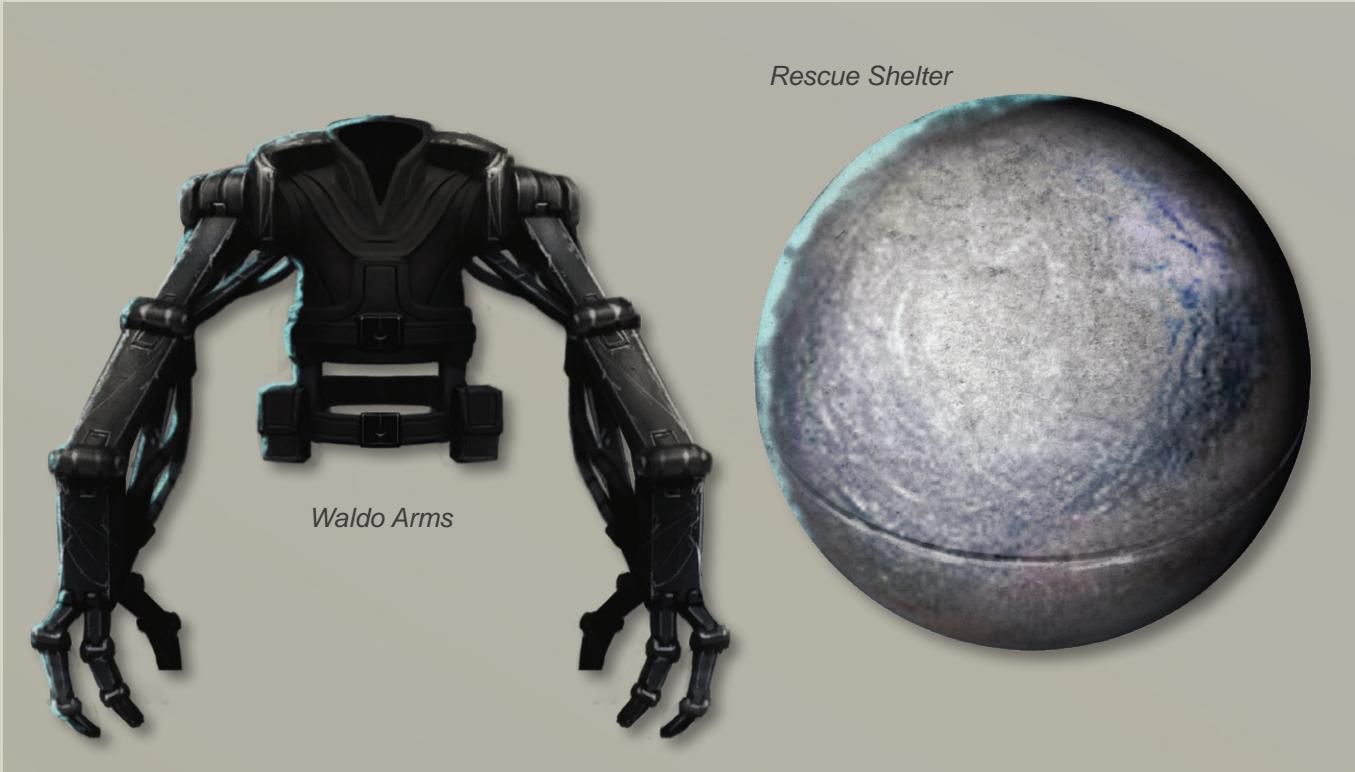
This is the stock space tool kit, arranged to distribute mass and enable easy access.

Item	TL	Slots	Kg	Cost
Tool Kit	10	1	30	Lv8000

WALDO ARMS

Waldo arms add a set of larger, remote controlled arms to a hardsuit. They are controlled by an exoskeleton control rig linked to the suit's arms to allow fine control of the waldos. The waldo arms have STR 20 and DEX 6.

Item	TL	Slots	Kg	Cost
Waldo Arms	10	1	30	Lv8000



PERSONAL LIFE SUPPORT SYSTEMS [PLSS]

The heart of a spacesuit is the Personal Life Support System, sometimes called the mission pack. The PLSS is responsible for providing air, power, heating and cooling for the occupant of the suit. Most PLSS units have external racks for air bottles and can hot-swap them.

It is usually carried as a waist pack or backpack and connects directly to the suit without external hoses or wiring. In some cases, the PLSS is in a suit-case style unit, connected to the suit by a hose, power and data lines. This unit provides power to the suit for heating and cooling but, more importantly, also contains equipment required to monitor and regulate the user's breathable air.

PLSS units are rated by duration and overall quality. Class A units are the smallest and least capable, while the large Class E units are usually reserved for industrial mining and construction.

PLSS units can hold up to four air bottles, half of which are usually reserved as spares with smaller capacity than the primary tanks. All PLSS units have the capacity for at least one bottle. Aside from PLSS A units, that bottle can be of any size. Additional bottle racks are added separately, though if a person is very quick, they can change bottles on the fly. The tanks themselves are available in four sizes, from 30-minute to eight-hour tanks. PLSS units are rated on the life of their atmospheric scrubbers and power supplies.

There are a large variety of PLSS units available, from a variety of manufacturers. The examples below are representative of the various types.

HYDE DYNAMICS 'LIFELINE' CLASS A PLSS

The LifeLine is typical of the smallest class of PLSS, the Class A. It is used extensively by the ASF in all of their combat spacecraft. In military vessels,

atmosphere is normally evacuated before combat to reduce the chances of explosive decompression, air loss, fires and other hazards. All crew wear suits and those at duty stations attach their air and power lines to the ship itself. In case of emergency, each crew station in the ASF has a LifeLine under the workstation. They are trained to disconnect the umbilical from the ship, reach under the workstation and reattach the umbilical to the Lifeline. It is designed to be carried like a small suitcase or messenger bag, although other models are worn as a waist pack.

The Lifeline includes a 60-minute air bottle and scrubbers to allow up to two hours of operation. Like all PLSS A units, it cannot be fitted with a bottle rack.

RUFFIN ORBITAL SCIENCE SUSTAINER

The Sustainer is an example of a Class B PLSS. French Navy crewsuits have one attached, rather than relying on an external unit like the LifeLine. The crewsuits still use shipboard air and power until there is an emergency that forces them to disconnect. Then they switch to the mission pack.

The Sustainer is heavier than a LifeLine and its placement high on the back can throw off a Traveller's balance. However, it can take any size air bottle and has scrubbers good for up to six hours of operation. The power supply is likewise good for six hours. In French service, the Sustainer is usually equipped with a four kilograms high pressure air bottle, good for four hours.

Mass and price do not include the air bottle. The Sustainer can take a bottle rack but can only put one bottle in the rack due to the unit's location on a suit.

Item	TL	Air Bottle	Power/Scrubber Duration	Expansion Slots	Kg	Cost
LifeLine PLSS A	12	N/A*	2 hours	0	6	Lv2000
Sustainer PLSS B	12	1	8 hours	1	6	Lv2200

*Integral to mission pack

Item	TL	Air Bottles	Power/Scrubber Duration	Expansion Slots	Kg	Cost
Divine Breath PLSS C	11	2	24 hours	0	10	Lv3000
StarLung PLSS D	11	3	24 hours	2	6	Lv4000
Long Haul Class E PLSS	11	4	48 hours	4	44	Lv12000

MANCHURIAN SPACE ENVIRONMENT SYSTEMS 'DIVINE BREATH'

The Divine Breath is a solid design, widely used throughout the Manchurian Arm. It comes in two versions; the first is a typical back-pack style design, capable of adding a bottle rack and upgrades, the second identical mechanically but designed to fit in the hatch of the suit lock on the Star Wander suit. This version can mount a bottle rack but it is exterior to the suit rather than hanging off the PLSS. The costs and characteristics of the two types are the same.

AIRWORKS 'STARLUNG'

The StarLung is a British competitor to the Trilon Far Traveller PLSS C (see page 89 of *2300AD Characters and Equipment*). While the Far Traveller sees wider usage, the StarLung is generally regarded as superior. It is not equipped with expansion capability, unlike the StarLung, and most experienced spacers appreciate the ability to upgrade and customise their life support systems.

Mass and price do not include the air bottle. The StarLung can take a bottle rack and is capable of carrying up to three air bottles internally.

L'ETAGE 'LONG HAUL' CLASS E INDUSTRIAL PLSS

The Long Haul Industrial PLSS is a very robust unit, encased in an armoured shell with an external crash cage to protect the mission pack and bottle rack (Protection +8). It includes a set of waldo arms to assist in construction, maintenance and repair tasks, and comes pre-fitted with the capability to take UHP air bottles, greatly extending operational duration.

Mass and price do not include the air bottle. The Long Haul is designed with an integral bottle rack and is capable of carrying up to four air bottles internally.

BOTTLE RACKS

Bottle racks clip to the PLSS and include all couplings and manifolds required to connect all bottles on the rack. A bottle rack can hold up to four additional air bottles and bottles can be swapped out on the fly. Racks have an external insulation layer and the bottles are heated or cooled to keep them functional. Swapping a bottle requires the insulating layer be opened but as long as the action is brief enough, this does not compromise bottles in the rack.

Item	TL	Kg	Cost
Bottle Rack	10	4	Lv400

Air Bottles

Most modern PLSS units have swappable air bottles in the mission packs and many models are equipped with external bottle racks. There are two types of air bottles available; high pressure (HP) and ultra-high pressure (UHP). All air bottles are refillable.

High Pressure Air Bottle

High pressure air bottles are the standard for most uses. They are one of the few things that are standardised across human space, as the last thing an orbital worker would want is a full air bottle with incompatible fittings. While there was a plethora of types in the early years of space travel, most nations eventually settled on the ESA 'J'-type, even Manchuria. America and Australia were the only holdouts, preferring the CGA-959 but they came around in the 2260s.

Duration	TL	Kg	Cost
45 min	9	1.5	Lv60
90 min	10	3	Lv80
180 min	10	5	Lv100
360 min	11	9	Lv200

Ultra-High Pressure Air Bottle

Ultra-high pressure air bottles are a relatively new option and it is uncommon to see stock PLSS units that

can make use of them. It requires different fittings and feed equipment than standard bottles and the two are not interchangeable.

Many military suits make use of them and Belters in particular will switch over to the UHP bottle whenever they can.

Duration	TL	Kg	Cost
90 min	11	1	Lv200
180 min	11	2	Lv400
360 min	12	4	Lv800
720 min	12	8	Lv1600

PLSS Options

Most PLSS units have internal space and system capability to add options and upgrades. Many suit options can be added to the PLSS as well, with waldo arms being particularly popular.

ADDITIONAL SCRUBBERS

By adding additional scrubbers to the system, life support duration of the PLSS is extended by 50%.

Item	TL	Slots	Kg	Cost
Additional Scrubbers	10	1	4	Lv3200

ADDITIONAL BATTERY

By adding an additional battery pack, power duration of the PLSS is extended by 50%.

Item	TL	Slots	Kg	Cost
Additional Battery	10	1	8	Lv1500

LAFARGE RADIATION SCREEN

Similar to the rad screens used by spacecraft, the Lafarge electromagnetic deflection system provides +500 rads protection against most types of charged particle radiation.

Item	TL	Slots	Kg	Cost
Lafarge Radiation Screen	11	2	10	Lv12000

UHP BOTTLE ADAPTER

Ultra-high pressure (UHP) air bottles hold more air under higher pressure but require a special adapter and handling equipment for use in a PLSS.

Item	TL	Slots	Kg	Cost
UHP Bottle Adapter	11	1	2	Lv2000

Crew Manoeuvring Units

The Crew Manoeuvring Unit (CMU), sometimes called an EVA pack, attaches directly to a backpack PLSS. All PLSS classes except A and B can accept a CMU.

The jets are arranged on movable arms, allowing their height to be adjusted to match the user's centre of balance and they can fire to both the rear (for gaining velocity) and the front (for braking). An emergency radio beacon is included on the pack.

Using an EVA pack can be tricky. It is easy to build up too much velocity to safely stop and return. Modern EVA units have fail-safes to prevent such accidents. Military EVA packs, however, do not, although they typically carry more propellant.

L'Etage Voyageur EVA Pack

The Voyageur EVA pack is one of the more common crewed manoeuvring units available, with thousands sold in the past 40 years. While the design is old, it is a solid and trustworthy model, easy to maintain and repair.

Like most EVA packs, it is equipped with both visual and radio beacons to make it easier to spot and track. While the Voyageur does not come with any frills, it is easy to upgrade and modify.

EVA Pack	TL	Movement	Range	Kg	Cost	Upgrade Slots
Voyageur	10	4 m	4 km	40	Lv10000	2
Colibri	11	6 m	18 km	55	Lv13500	—
ST50	12	10 m	10 km	60	Lv16000	—

Hyde Dynamics Colibri EVA Pack

While Hyde is best known for making space weapons, some of that expertise carries over to small spacecraft and crewed manoeuvring units. The Colibri uses a scaled-down version of the Course Correction System (CCS) used on the SIM-14 missile, which gives it more thrust and manoeuvring capabilities than many competitors.

The Colibri is equipped with waldo arms to assist in orbital tasks.

The Bespoke Suits of Hesperides Station

Hesperides is a small asteroid station in the leading Trojan cluster of Foucault, the largest gas giant in the Bessieres system. Hesperides is one of the few permanently-crewed stations in the system and a bit of a thorn in the side of the Bessieres corporation. It provides support to the independent miners and prospectors in the system.

For all the Spacer peoples, spacesuits are critically important systems. For Belters, however, they are life itself. Belters spend most of their working lives in spacesuits and each suit becomes heavily customised over time, modified and adjusted to the needs of the wearer. Hesperides Custom Skins has the facilities to build perfectly measured and fitted suits, exactly as the user desires. Such suits are more expensive but, in the long run, worth every penny.

The fit on a Hesperides custom skin is so good that it provides DM+1 to any Athletics check while in zero-gee. Moreover, as everything is set up exactly as the user stipulates, any Mechanic, Electronics or Profession (belter) check likewise gains DM+1.

Each Hesperides custom skin is also decorated on the exterior in a distinctive style. While the nature of the art is up to the user, they are all very clearly Hesperides skins and a point of distinction in most Belter communities. Any non-Belter that obtains a custom skin is looked on with disdain by most Spacers, derided as a poser.

A Hesperides custom skin is double the price of a standard spacesuit.

Trilon ST50 Crewed Manoeuvring System

Like much of the equipment that Trilon produces for space, the ST50 is solid, reliable and unimaginative. It is also one of the best available.

The ST50 has a LaFarge Radiation screen generator install to help protect a Traveller from charged particles during long EVA missions.



EXPLORATION AND SURVIVAL GEAR

With the discovery of new worlds to inhabit, humanity has had to come up with a whole suite of technologies to aid life in foreign and hostile environments. In some ways, settling planets was trickier than settling space. Space is clearly hostile and history has shown that again and again. Planets, however, seem much safer. There is gravity, air to breathe, protection from radiation and temperatures normally in the human comfort range, or at least not far outside it. All of these factors can lull a Traveller into a false sense of security.

GRAVITY

While there is gravity, it is different than what humans experienced for millennia and will affect everything from the way people walk to their reflexes. Things move differently, fall differently and it takes time to adjust to that. Gravity affects atmospheric pressure, oceanic pressure, erosive strength of wind and water, and many other variables that few people take into consideration.

ATMOSPHERE

While there may be air, there could be contaminants, allergens, toxins, or poisonous elements. The air could be thicker or thinner than Earth's, with a different mix of gases. While it is easy to understand the risk of a greater percentage of carbon dioxide or sulfur dioxide, for example, even oxygen can be dangerous in large amounts, as evidenced on Cold Mountain. Even sound will change, depending on air pressure, density and gas mix. Then there is the risk of disease. Humans (in their modern form) have existed on Earth for 300,000 years and new diseases and organisms are still being discovered. The longest settled world, however, has seen a human presence for less than 200 years. Even worlds with incompatible biospheres can, given the mutation rate of viruses and bacteria, adapt to make use of a new host.

RADIATION

While an atmosphere and magnetic field provide protection from radiation, some worlds lack a strong magnetic field or even a magnetic field at all, like Ellis. Other worlds around smaller, cooler suns may be more affected by solar flare activity, as with Kanata, while worlds with thinner atmospheres

provide less protection from ultraviolet radiation. Scientists are still studying the local stars of the worlds of the Frontier and there is much to learn.

TEMPERATURE

Most settled worlds are within human norms but there are exceptions, like Dukou on the cold end and Crater on the hot. Even on temperate worlds, different planetary conditions can lead to greater or faster temperature swings. A small world with a thin atmosphere might see greater swings between day and night temperatures. A world like Beowulf, with an extremely long day, might see a slower shift from day to night but the long nights are liable to be brutally cold as they edge towards dawn.

HARD PATH VS. SOFT PATH

There are two schools of thought, or philosophies, when settling new worlds; the Hard Path and the Soft Path. The Hard Path uses so-called 'hard' technology to adapt to new worlds, including everything from the lowly filter mask, probably the most common symbol of the Hard Path, to building domed cities. The settlement of Hochbaden is the greatest expression of the Hard Path yet, although Nibelungen's domed cities and Trilon's terraforming project on Kie-Yuma are other good examples.

The Soft Path, in contrast, emphasises living with the biosphere of other worlds. While most interpret that as DNA modification, the Soft Path is more than that. The core idea of the Soft Path is to 'go native' on colony worlds, to be able to survive without high technology, to know and be part of the world; to blend human technology with the world around them to achieve fusion, rather than living apart from the natural world. The settlement of Cousteau on New Austin, with its graceful buildings of native materials dipping down, and into, the ocean waters, is often cited as the best example of the Soft Path. A true Soft Path approach is not yet possible. Even with DNA modification, humans are still alien to their new worlds.

The Hard Path is often characterised by its proponents as 'the way things are', while supporters of the Soft Path instead declare it is 'the way things should be'.

EXPLORATORY EQUIPMENT

This chapter covers various types of gear that are of use when exploring a planet's surface. This equipment is not only used by exploratory teams and much of it is also of use in many other situations and other career fields, including wilderness recreational activities.

Wilderness survival gear includes equipment which is usually used by exploratory teams, but this might be stored in a starship's escape pod or used by a military mission team as well.

This equipment is generally used when traversing wilderness areas, providing both speed and safety.

Autograpnel

The autograpnel consists of a handheld, battery-powered compressor unit, which can fire a small grapnel as far as 20 metres, then pull a load of 100 kilograms up the trailing rope. The battery is rechargeable and is good for 20 uses. It takes about three minutes for the compressor to build up enough pressure to fire the grapnel to maximum height on a normal-gravity planet.

Item	TL	Kg	Cost
Autograpnel	9	7	Lv660

Backpack

The Nordique Q7-series external frame backpack is used to carry equipment (as well as protect it) while keeping hands free. Small items can be suspended from its frame and includes a three-litre hydration pack with a tube that runs up to the wearer's mouth. The external frame allows it to distribute weight and carry a larger volume of supplies and gear.

Item	TL	Kg	Cost
Backpack	10	1	Lv100



Compact Rations



Climbing Kit



Biomonitor



Autograpnel

Biomonitor

The biomonitor is a broad-purpose monitor about five by eight centimetres and usually carried on the belt or wrist. It can give body function readouts for medical diagnosis, monitor breathability of atmospheres (noting presence of various gases, harmful pollens and other toxins) and when connected to a nanocomp or portacomp, can give analysis of the edibility of plant and animal tissue.

Item	TL	Kg	Cost
Biomonitor	10	1	Lv500

Canteen

The normal canteen is a two litre container with a basic microfilter for limited purification to water as it is filled. The filter cartridges are only good for treating fairly clean water and while they filter contaminants, are not as effective at filtering pathogens.

Item	TL	Kg	Cost
Canteen	8	2	Lv20

Climbing Kit

A climbing kit includes such tools as pitons, 100 metres of fine rope, small hammers and carabiners. Use of the kit confers DM+1 to all Athletics checks related to climbing.

Item	TL	Kg	Cost
Climbing Kit	8	2	Lv500

Compact Rations

Each ration pack is a complete, pre-packaged meal, providing about 1,000 calories and fortified with a full day's requirement of vitamins and minerals. Each meal comes in its own self-heating (or self-chilling, for some dishes) serving tray. The heating/cooling process is activated by breaking the seals and takes about 30 seconds.

The high quality ration pack is aimed at the well-to-do backcountry adventurer. Many commercial starships take on ration packs of this quality for serving passengers.

For military issue, these meals provide 2,000 calories and consist of more basic fare, easily-digested and not likely to cause stomach upsets. They are also bland to the point of tastelessness and all portions of the meal have textures that can best be described as 'interesting'.

Item	TL	Kg	Cost
Ration Pack	8	0.5	Lv15
Military Ration Pack	9	0.5	Lv90

Food Synthesiser

A food synthesiser can be used to detoxify local food sources and add essential elements for human consumption when compact rations are not available. Sometimes a food synthesiser can even make the result palatable. When using a food synthesiser, an operator packs the mixing chamber with native foodstuffs (plants and plant analogues work best but animal tissue can be processed if enough time is allowed). The synthesiser chemically analyses the contents, irradiates them to kill local pests, neutralises or filters out toxic elements, adds missing vitamins and minerals and ejects the result in either a dried or pulpy form (operator's choice). However, a food synthesiser cannot add missing amino acids, nor can it change the chirality of proteins and carbohydrates.

Food
synthesiser



Flares

Backpack



The amount of food produced and the time required to do so is dependent upon the 'edibility rating' of the beginning foodstuffs. The Referee should assign each type of native foodstuff a rating of 1-10, with one being the most edible and 10 the most dangerous. The edibility rating is the number of hours the food synthesiser requires to process the foodstuff into one meal.

Food synthesisers require refills for their vitamins and minerals, usually once per month but can be as often as once per week in particularly nutrient-poor environments.

Item	TL	Kg	Cost
Food Synthesiser	11	25	Lv1500
Refill Pack	11	1	Lv50

Flares

Flares are used to signal at a distance, such as in the marking of temporary landing areas. They typically come six to a set.

Item	TL	Kg	Cost
Flares	9	1	Lv10

Inertial Compass

An inertial compass is a small, wrist-worn unit that always points towards a pre-set location (usually north). The inertial compass will always indicate the pre-set direction even if its wearer undergoes movement involving flight or underwater travel.

Item	TL	Kg	Cost
Inertial Compass	9	—	Lv80

Inertial Map

An inertial map is a small nanocomp that contains a detailed map of an area in its memory, showing a small holographic picture of a 10-kilometre square area. Once the user has entered their present coordinates, they are represented as a dot in the centre of the screen and the map moves about that dot as the user travels. Inertial maps are often hooked up to display on other screens, such as the terrain display of a vehicle or combat walker. Map chips cost Lv15 for a 1,000-kilometre square area. Making map chips of uncharted areas and then selling them is an easy way to pick up extra money on many missions.

Item	TL	Kg	Cost
Inertial Map	11	0.5	Lv200

Lighter, Wind-Proof

Using hydrogen fuel and an electric element, the wind-proof lighter creates a high-pressure plasma flame at nearly 1,000° C. Turning off the lighter shuts down the fuel flow and shuts off power to the element. The lighter contains enough fuel and power to remain lit for five full minutes. Refilling the lighter costs about Lv3 for a new battery and fuel.

Item	TL	Kg	Cost
Lighter, Wind-Proof	11	—	Lv16

Load-Bearing Harness

The load-bearing harness is actually a belt and vest, designed to allow an explorer (or soldier) to carry their equipment load distributed evenly across their body. Pockets and pouches can be attached anywhere on the vest using quick-release gekkotoe material.

Item	TL	Kg	Cost
Load-Bearing Harness	9	2	Lv40

Multi-Tool

The Alpine Systems Matterhorn multi-tool is an all-in-one item, containing several key tools in a compact package. It contains the following tools in an easy-to-open frame: Spring-loaded needle nose pliers, rotatable carbide wire cutters and strippers, eight centimetres fine edge blade, magnetic eight centimetres centre-axis bit driver, pry bar with nail puller and bottle opener, serrated blade, awl and file, magnetic screwdriver bits and a lanyard hole. It also comes with a nylex sheath.

Item	TL	Kg	Cost
Multi-Tool	10	0.25	Lv165

Pressure Tent, Small

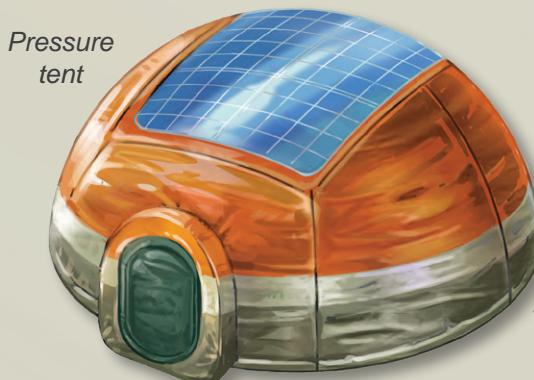
The Ruffin Orbital Systems TenEx pressure tent is an inflatable hemispherical tent with a radius of two metres. The tent includes a small airlock along with a life support system good for 12 person-days (i.e. 12 people for one day or one person for 12 days). The airlock can be detached for use on worlds with breathable atmospheres. It is powered by a solar panel built into the roof, but if that is obscured it has power for 12 hours.

Item	TL	Kg	Cost
Pressure Tent, Small	10	2	Lv2000

Pressure Tent, Large

The SorTech Expeditions Kerguelen is an inflatable half-cylinder with a width of four metres and a length of 10 metres, making it suitable as an exploration base. The tent includes a small airlock and the life support system is good for 120 person-days. The interior can be subdivided many different ways. The large tent is powered by rooftop solar cells but it can also be run off a Light power supply. The large pressure tent is self-assembling.

Item	TL	Kg	Cost
Pressure Tent, Large	11	15	Lv5000





Multi-Tool



Portable stove



Respirator

Respirator

Often an entire protective suit is unnecessary and unwieldy. In such situations, people commonly use a simple respirator mask like the AirLine D-98 to filter the air they breathe. Typically, the filters must be changed every 6-12 hours, depending upon the level of pollutants in the air. A filter mask grants DM+2 to checks resisting atmospheric taints, including PAS checks.

Item	TL	Kg	Cost
Respirator	8	1	Lv100
Replacement Filter	8	—	Lv5

Rope

Rope is available in a multitude of materials, from spun glass fibre and synthetic polymers to natural long-fibres like hemp or jute. The rope presented here is typical of the natural fibre ropes common in utility use on many colony worlds. It has a breaking weight of 500 kilograms (adjust weight for local gravity) and masses one kilogram per five metres of length.

Item	TL	Kg	Cost
Rope	3	1/5 m	Lv5/metre

Rope, Advanced

Spun carbon fibre rope, just barely thick enough to grab, requires special gloves to handle. The carbon fibre rope has a breaking weight of 10 tons and masses one kilogram per 100 metres of rope.

Item	TL	Kg	Cost
Rope, Advanced	10	0.01/metre	Lv100/metre

Skis

Cross-country skis allow rapid travel over unbroken snow. Skis have a quick release clamp for the special shoes worn with them. The price of the

skis includes the shoes, along with poles used for additional pushing and balance. They have the effect of doubling speed on a successful Routine (6+), Athletics (endurance) check.

Item	TL	Kg	Cost
Skis	8	3	Lv250

Snowshoes

Snowshoes may be large and awkward but permit normal walking speed over deep snow. Otherwise, snow deeper than knee height will reduce movement by half, while snow thigh-deep or deeper will slow a person to a speed of one metre.

Item	TL	Kg	Cost
Snowshoes	8	2	Lv120

Stove, Portable

The Colson Hotpoint portable stove is a small electric stove powered from a rechargeable battery. Solar panels on the lid of the stove recharge the battery when closed. Each five minutes of use requires 30 minutes of charging time, with the battery able to provide 40 minutes of cooking time before being exhausted.

Item	TL	Kg	Cost
Stove, Portable	10	2.5	Lv100

Tent

The Angstrom Recreation ‘Heyerdahl’ Smart Tent is a non-pressurised tent that sleeps four. It uses memory plastic materials to set itself up and take itself down, and without human intervention takes 10 minutes to set up. With human help it takes five. Inflatable pads in the tent’s floor give it rigidity and provide comfort.

NanoGard™ material resists dirt, mold and mildew, and water rolls off of it. At the same time, it breathes freely and the material wicks moisture out of the tent, eliminating condensation. For an extra Lv75, it is available with ColourChange™ walls that can change the colour and reflectivity of the tent walls to one of 16 settings.

The only things that the tent cannot do by itself are stake itself down or remove the stakes. A person is still necessary for that.

Item	TL	Kg	Cost
Tent	11	2	Lv250

Water Purifier

The water purifier is a battery-operated microfilter and chemical treatment machine used for purifying natural water sources. The machine can also be used to recycle biological waste-water. Fifteen minutes are required to treat each litre of water.

Item	TL	Kg	Cost
Water Purifier	9	6	Lv800



Water purifier



Tent

Pathfinders

The British Pathfinder Corps is perhaps the most famous of the professional colony ground breakers but they are based on an earlier Azanian organisation, the Voortrekkers (fr. Afrikaans: Pathfinder). During the late 21st and early 22nd centuries the European-minority population of Azania experienced significant prejudice and most were segregated into homelands. That state of segregation largely eased by the late 22nd Century and people of European descent became fully integrated into mainstream society. Prior to that, however, the movement of Europeans was restricted.

When Azania began looking for volunteers to assist in planning and ground-breaking operations on the newly opened world of Tirane, young people from Natal and Transvaal flocked to the recruiting centres. Here was a chance to reclaim the semi-nomadic lifestyle of the early Boers on a new world.

The Voortrekkers developed a good many of the tools and techniques used in modern colony planning and preparation but after Tirane the Azanians halted further expansion until the mid 23rd century, disbanding the Voortrekker Corps. While some were involved in planning the outpost at Nyotekundu, that world was not exactly to their liking.

Britain saw the opportunity to establish its own pathfinders and a good many of the Voortrekkers found themselves in the employ of the crown. The irony was not lost on the descendants of the Boers. Even now, terminology and jargon within the Pathfinder Corps has a number of Afrikaaner and Swahili words and phrases, a testament to the first of the colonial pathfinders.

SURVIVAL EQUIPMENT

As opposed to general outdoor equipment used for exploration and recreation, survival equipment is intended to be lightweight, easy to use and often single use. These supplies are for emergencies, not casual treks.

Survival Blanket

The survival blanket is a thin sheet of windproof synthetic, with a reflective layer kept inwards towards a person's body, capturing their heat. A ceramic heating element and a thin-film battery provide additional warmth for up to 18 hours. The survival blanket increases effective temperature by 10° C, or 20° C if there is still power for the heating element.

Item	TL	Kg	Cost
Survival Blanket	10	0.5	Lv10

Survival Cocoon

The survival cocoon contains heating and cooling elements to keep the occupant comfortable in almost any temperature. It includes a hood with a heat-exchange unit to pre-warm or pre-cool incoming air, and self-inflating pockets along the back to provide support and comfort to the occupant. The included power cell provides up to 48 hours of comfort at extremes down to -40°C and up to +50°C.

Item	TL	Kg	Cost
Survival Cocoon	10	3	Lv200

Survival Kit

The Archer 144 is a six-day (144 hour) backpack survival kit, which is packed one per passenger on commercial lifeboats, whether sea-going or spacecraft. Many colonial governments also distribute these to their citizens, especially on worlds like Beowulf and Aurore, where seismic activity is a daily occurrence.

Each kit contains 24 litres of water, water filtration kit, six flares, knife, entrenching tool/hatchet, flashlight, emergency locator transmitter, small first aid kit, four survival blankets, 50 kilometre range transceiver, solar charger, hand-crank charger, six days of food



Survival cocoon



Survival Kit

concentrate, respirator mask with 10 filters, 3 x 4 metre tarp, moist towelettes and disposal bags, chewing gum, a box of SofStuff and box of 500 matches.

Item	TL	Kg	Cost
Survival Kit	10	25	Lv350

Survival Tent

The OutRec LifePod is a two-person single-use inflatable tent. A pressurised canister inflates the tent supports and then fills them with a fast-hardening insulating foam. A high-density battery then provides heat and light to the pod for up to 72 hours. It does not come with a beacon but the outer layer is highly reflective to visible light, infrared and radar, enabling it to be easily found, even under snow.

Item	TL	Kg	Cost
Survival Tent	10	3	Lv200

AQUATIC EQUIPMENT

The sea is a potentially hostile environment that tests humans and equipment alike. There are similarities between the depths of space and the depths of an ocean. Like space, an ocean holds vast areas where a sun's light and heat are too tenuous to support life. Like space, oases of life are often found in these regions when geologic activity provides heat and food. And like space, an ocean requires humans to have special equipment when exploring its depths. The ocean depths can be more hostile than vacuum, with extremes of pressure and technical challenges that surpass the requirements of space activity.

Fishing Equipment

On worlds where sea life is edible or has an industrial use, a variety of different technologies are employed.

Rods, Lines and Nets

While a simple fishing rod is best for sport fishing, it is possible to feed oneself or a family just with a rod but the work is labour intensive. Long lines and nets multiply the effort, landing more fish in an equal amount of time. Long lines and nets should be used from boats to be most effective but a fishing rod will work from shore or a dock.

A long-line is a long, strong synthetic cable with a baited hook every few metres, while a net is large, strong plastic netting towed behind a boat to catch large amounts of fish.

In areas with abundant fish, a Routine (6+) Survival or Profession (fisherman) check (1D hours, INT) will determine successful fishing. The Effect is the amount of fish caught per hour in kilograms, multiplied by the equipment used.

A sonar unit grants DM+2.

Item	TL	Kg	Cost	Multiplier
Fishing Rod	4	2	20	x1 kg
Long Line	4	50	100	x100 kg
Net	3	100	400	x500 kg

Sea Floor Trap

On Earth, sea floor traps are used to catch lobsters and crabs. On colony worlds, they can trap similar creatures, like the Hermes glass crab or similar niches, like the Montana spider-worm. A Difficult (10+) Survival check (3D hours, EDU) will yield 100 kg of sea floor creatures per point of Effect.

Item	TL	Kg	Cost
Sea Floor Trap	9	25	Lv250

Safety Equipment

The seas of any world can be a harsh and unforgiving place. Safety equipment keeps people alive if used properly.

Immersion Suit

The immersion suit combines the qualities of a battery-powered heatsuit with a water-tight outer layer. The outer layer is drawn up tight around the face and inflatable cuffs at the wrists, shoulders, knees and neck prevent water leakage into the core body region. High-pressure gas bottles inflate the suit's floatation bladder and trigger when the suit hits the water. The bladders are designed to orient the suit so that the face is clear of the water. An immersion suit will provide enough heat to keep the wearer alive for several hours in sub-zero conditions.

Item	TL	Kg	Cost
Immersion Suit	9	5	Lv800

Life Raft

The basic life raft is a self-inflating boat rated to hold 1,000 kilograms in standard gravity and can actually hold up to 1,400 kilograms before swamping. In contrast to the inflatable boat, the life raft inflates in less than five seconds and is a single-use device designed to be thrown off a ship and inflate explosively before it hits the water. The basic life raft is an open design, not intended for long periods of use or in inclement weather.

Item	TL	Kg	Cost
Life Raft	8	10	Lv300



Personal Flotation Device

The personal floatation device (PFD), often called a life jacket, is required wearing for anyone in a small boat or any boat in heavy weather. It is worn as a normal vest or jacket and will inflate the floatation bladders in a manner similar to the immersion suit if the PFD contacts water. An uninflated PFD does not hinder the wearer's movement but an inflated PFD inflicts DM-1 to most physical-based checks aside from walking or swimming, but provides DM+2 to Athletics (endurance) checks while trying to stay afloat. PFDs are also available for dogs, at the same price.

Item	TL	Kg	Cost
Personal Flotation Device	8	1.5	Lv80

Survival Raft

The survival raft is a fully-enclosed version of the life raft, designed for long duration use, even in harsh climates. Each inflatable survival raft has enough room for four adults and includes an emergency beacon, radio, small heater and water purifier, all powered from a roof-top solar array. It also includes 40 person-days of rations, which can be stretched to 120 person-days with rationing.

Item	TL	Kg	Cost
Survival Raft	9	20	Lv3000

Diving Gear

Humans have long been fascinated by the world under the surface of lakes and oceans, and this curiosity extends to the worlds of the Frontier. Diving gear is designed to keep Travellers as safe and comfortable as possible, despite the hostility of the environment.

Decompression Chamber

A decompression chamber is used to return a deep diver to surface pressure at a slow enough rate that they do not suffer decompression sickness.

It is, in effect, a small habitat, with enough room to accommodate up to four divers. It is divided up into four rooms; living area, sleeping area, life support and the diving bell that moves the divers from their diving depth to the surface-based decompression chamber. Decompression time is typically 10 minutes per metre of depth. This means that a 200-metre dive will require 2,000 minutes, or just over 33 hours, to decompress.

Item	TL	Tons	Cost
Decompression Chamber	10	15	Lv45000

Diving Gear

Diving gear includes a flexible, warm wetsuit with swim fins, goggles and an air tank. The tank can hold enough air for three hours of use. It requires the Athletics (endurance) skill to use effectively. The gear adds 25% to a Traveller's underwater speed.

Decompression Sickness

One of the many hazards of deep-diving is the dreaded 'bends', arising from dissolved gases coming out of solution into bubbles within the body upon depressurisation. This bubbling can produce many symptoms and its effects may vary from joint pain and rashes to paralysis and death. Anyone who dives to depths greater than 30 metres must decompress and should ascend at a rate no greater than 10 metres a minute, with five-minute stops at 20 and three metres. Avoiding the effects of decompression sickness without doing this requires a Formidable (14+) END check. DM+2 applies if stopping at other intervals or DM+6 if a decompression chamber is available (these do not stack), and DM-1 per 200 metres of depth.

Safe diving depth for a diver with this type of gear is approximately 40 metres on Earth; divide 40 metres by the world's surface gravity to get the safe depth for other worlds.

Item	TL	Kg	Cost
Diving Gear	9	10	Lv2100

Diving Gear, Advanced

Advanced diving gear dispenses with the tank in favour of a gill unit and makes use of more sophisticated low-friction materials for the wetsuit and fins. The gill has enough power for 12 hours of operation, while the wetsuit and fins allow swimming at speeds 50% faster than normal. The gill can only be used in water with a high oxygen content. Advanced Diving gear requires the Athletics (endurance) skill to use effectively. This equipment has the same depth limitations as conventional diving equipment.

Item	TL	Kg	Cost
Diving Gear, Advanced	10	6	Lv3600

Fluid Rebreather Diving Suit

The fluid rebreather is designed to allow a human in a special suit to dive to tremendous depths. The oxygenated fluid of the system fills the diver's lungs and provides oxygen even more efficiently than air. Earlier versions had trouble with removing carbon dioxide but modern equipment solves that problem. Maximum depth with this system and a heated, flexible suit, is about 5,000 metres, although some have dived as deep as 9,000 metres on Earth. Note that surface ascent still requires the use of a decompression chamber.

Saturation Diving Suit

For extremely deep dives, a different breathing mixture is used, replacing nitrogen with helium and adding a symbiote to help further stabilise the diver. The suit is a hot-water wet suit to deal with the cold depths and uses special tanks and hoses to safely handle the saturation mix. It is bulkier than a normal suit and reduces swimming speed by 50%.

Diving gear



Saturation dives always require the use of a decompression chamber. The maximum safe depth for a saturation dive is 20 times deeper than with a conventional mixture.

Underwater Rebreather

The underwater rebreather is an air-recycling pack that rests upon the user's back, with hoses leading to a mouthpiece. Filters in the rebreather scrub CO₂ from the user's exhaled air and a battery-driven electrolyser removes oxygen from the surrounding water, adding it into the recycled air. With a rebreather, a diver can remain submerged for days at a time. The only limits are imposed by the life of the CO₂ scrubbers and the electrolyser's battery pack. Each of these is good for 72 hours before service is necessary. Underwater rebreathers have double the safe dive depth of conventional diving gear.

Armour Type	Protection	TL	Rad	Kg	Cost	Required Skill
Fluid Rebreather Diving Suit	+5	11	50	22	Lv8000	Vacc Suit 0
Saturation Diving Suit	+3	10	—	30	Lv2500	None
Underwater Rebreather	11	10	—	—	Lv2100	None

Miscellaneous Equipment

There is a wide variety of other equipment that can also be used in aquatic environments.

Desalination Filter

The ocean waters of most colony waters have dissolved minerals in them that need to be removed. They can cause skin reactions, make people sick or just taste horrible. On a commercial scale, flash desalination and distillation provide an economic solution, although the power requirements are very high. For portable use, a desalination filter is used instead. It attaches over the mouth of a canteen before it is filled. A battery-powered osmotic filter forces water through the membrane, leaving any salt or other dissolved minerals behind.

Item	TL	Kg	Cost
Desalination Filter	10	0.5	Lv250

Inflatable Boat

The inflatable boat is filled from a battery-powered pump or containers of pressurised air. Using the pump, it takes five minutes to inflate the two-person boat and 12 minutes for the four-person model. Two pressurised cans are able to inflate the two-person model within 20 seconds, with five doing the same for the larger version. The two-person boat comes with a pair of oars, while the large version has a rigid board to hold a small electric motor (not included) in addition to included oars.

Item	TL	Kg	Cost
Inflatable Boat (2-person)	9	7	Lv100
Inflatable Boat (4-person)	9	12	Lv300

Portable Sonar

The portable sonar unit is used both on and under the water to see beyond visual range. It consists of a small transducer unit that both generates sonic pulses and receives them, and the handset, which interprets the data received to construct a 3D image of the surrounding region, out to about 150 metres. The handset can be connected to a portacomp or similar device to provide even more information. They are often used by sport fishermen and amateur divers but are not accurate enough for military applications.

Item	TL	Kg	Cost
Portable Sonar	9	2	Lv90

Small Electric Motor

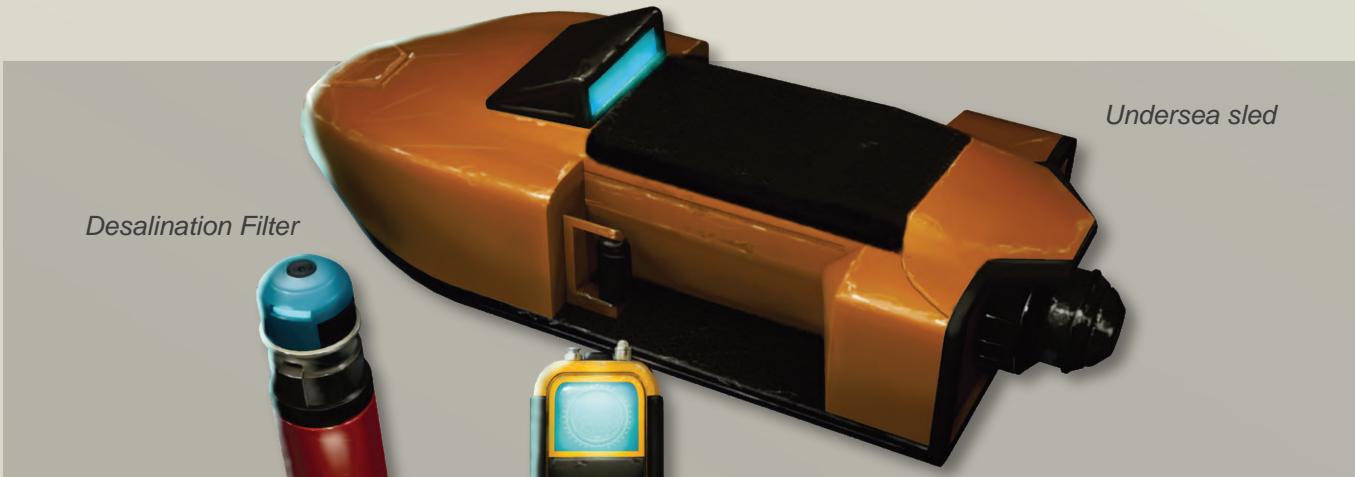
This motor and battery-pack combination has a sufficient charge to run the motor for about three hours and can propel a fully-loaded four-seat boat at Idle speed.

Item	TL	Kg	Cost
Small Electric Motor	9	8	Lv150

Undersea Sled

The sled is a small, battery-operated towing unit for a single diver. Controls are very simple and it uses Athletics (endurance) to operate. It moves at Idle speed and can dive to 500 metres before hollow spaces inside are crushed. The battery is good for six hours at top speed.

Item	TL	Kg	Cost
Undersea Sled	9	40	Lv200



Undersea sled

Portable sonar

SENSORS AND SCOPES

Sensors are designed to make environmental information easier to obtain. Whether it is to bring distant objects closer or peer through a forest to see hidden secrets, sensors extend the abilities of their users.

Basecamp Security Sensor

The Aquitaine BSS-2 is a multipurpose active/passive sensor suite designed to provide warning against intruders at remote sites. It must be attached to at least a Light power supply to function. The security sensor functions as an Enhanced vehicle sensor system.

Item	TL	Kg	Cost
Basecamp Security Sensor	11	50	Lv20000

Binoculars

The standard optical binoculars available to purchasers in the 24th century incorporate thermal imaging for night visibility and limited visibility in fog, gyro-stabilisation for high magnification steadiness and adjustable magnification from 1x through 20x. Some models are equipped with a light-intensification system and passive or active ranging systems.

Item	TL	Kg	Cost
Binoculars	10	0.5	Lv120
Light Amplification	10	+0.5	+Lv400
Passive Range Finding	10	—	+Lv100
Active Range Finding	10	—	+Lv200

FarScope

Also from Danforth Optics, the FarScope is a spotting scope that incorporates the same technologies as the FarSeer, in a package more compact than the spotting scope. Available magnification spans 15x to 200x and includes a light intensifier for night-time viewing. It has the same disadvantages as the FarSeer, however.

Item	TL	Kg	Cost
FarScope	12	3.5	Lv800

FarSeer



Binoculars

FarSeer

The Danforth Optics FarSeer is a newly-marketed product that magnifies objects and/or allows night vision by internally enhancing the light received. The main lens is composed of oil, electrostatically-held and manipulated for focus. A read-out of the electrostatic charge that focuses the lens gives approximate distance to the object being focused upon. A backup system, consisting of a pulse laser, provides more accurate readings of any object lined up with a set of cross hairs in the front of the lens.

There are two disadvantages to using the FarSeer. One is that the laser is visible to instruments watching for it and the second is that the electrostatic lens will not hold focus in a strong electrical field, such as a nearby lightning storm. Nearby gauss weapon fire, including mass drivers, will also disrupt focus. The FarSeer magnifies from 1x to 100x. While it is popular with civilians, the vulnerability to magnetic fields makes it unusable for the military.

Item	TL	Kg	Cost
FarSeer	12	1	Lv250

Ground Penetrating Radar

The Aquitaine 'Groundhog' ground penetrating radar unit is contained in a small, low-slung four-wheel cart, with a long handle. It looks much like a conventional lawn mower. It is pushed across the ground in long swathes, crisscrossing an area until a suitable picture has built up. Output of the system is to any connected comp, although it is equipped with a nanocomp to run the system and keep backup data.

Item	TL	Kg	Cost
Ground Penetrating Radar	10	8	Lv800

Imager

The Momotaro Technologies Hotshot Imager with Realer Than Life™ Technology is a high definition digital imaging camera that can also shoot full 256 fps video to capture the action and with shutter speeds as fast as 1/10,000 of a second, it can also freeze it. Equipped with a 10x to 200x optical zoom, the wide field imaging processor can take images Realer Than Life™. Other lenses are available, including super telephoto and macro lenses.

Item	TL	Kg	Cost
Imager	11	0.75	Lv300
Super Telephoto Lens	11	3	Lv600
Macro (Close-up) Lens	11	0.5	Lv500

Infrared Viewer

The Hyde Dynamics G9 allows a user to see light in the infrared spectrum, allowing objects to be spotted by the heat they radiate. Infrared viewers do not provide physical details of objects, rather just their approximate shapes and heat-emission strengths. Two objects with roughly the same shape and heat output will look the same through an infrared viewer. Most infrared viewers have an effective range of 500 metres but very hot objects can be seen at much greater distances.

Item	TL	Kg	Cost
Infrared Viewer	9	0.2	Lv200

Large Life Form Detector

The Zoonics Canary is a moving point IR sensor which works as well on vehicles as it does on life forms. Its short range of only 1,000 metres makes it largely ineffective for military purposes, however. It is designed to be cheap and portable for zoological field teams.

Item	TL	Kg	Cost
Large Life Form Detector	10	2	Lv300



Microscope



Observatory element

Microscope

While the Danforth Optics Digimike microscope is aimed at the education market, the very qualities of robustness and ease of use that make it popular with students and educators also make it popular on the Frontier with scientists, explorers and medical personnel. With optical magnification up to 2,000x using near-field scanning, the Digimike can resolve objects and structures of just 20 nanometres in size.

The Digimike connects wirelessly to any standard comp, including Link phones, to display the images it captures.

Item	TL	Kg	Cost
Microscope	10	3.2	Lv800

Observatory Element

The Trilon Herschel Portable Observatory Element is a large, folding array telescope. The Henschel's seven mirror elements are 50 centimetres across, arranged in a hexagonal shape when the observatory is deployed. On its own, the element is a powerful telescope, able to easily resolve objects in low orbit or peer into the depths of space. However, its real power comes when it is linked to other telescopes scattered across the same hemisphere of the planet, creating an optical long-baseline array. Such an array can give detailed views of orbital structures and spacecraft, image nearby planets and scan the stars for new worlds.

Item	TL	Kg	Cost
Observatory Element	11	150	Lv15000

Portable Lab

The portable lab can only be used towards one scientific specialisation, selected at time of purchase. Use of the lab in the field grants DM+1 to research-based checks.

Portable labs are not available for all specialisations. Models are typically available for archaeology, biology, chemistry, physics, planetology and xenobiology. All portable labs require a portacomp in addition to the lab itself.

Item	TL	Kg	Cost
Portable Lab	11	15	Lv10000

Radio Detector

The Tesla Hut RD-9r is used to detect radio transmissions and locate the transmitter within five kilometres. To pinpoint the location of the transmitter, at least two radio detectors must be set up a minimum of one kilometre apart and both operators must succeed at locating it.

Detect a Radio Signal: Average (8+) Electronics (sensors) check (1D seconds, INT).

Pinpoint a Radio Signal: Difficult (10+) Electronics (sensors) check (1D minutes, INT).

Item	TL	Kg	Cost
Radio Detector	9	5	Lv600

Remote Meteorological Station

A small data collection station for monitoring rainfall, humidity, atmospheric pressure, wind speed and direction, and other meteorological and climatological data. These are generally cheap, unmanned sensors designed to transmit to a base station, although data-links are often unreliable; they also record data on a memory chip. Each chip can record three years' worth of data before it starts to overwrite old files. These are very useful in the early stages of a survey of a habitable world and for every 10 remote meteorological stations deployed on a planet, add DM+1 to checks that determine planetary climate (maximum DM+4).

Item	TL	Kg	Cost
Remote Meteorological Station	10	1	Lv550

Sampling Kit

A small kit carried by means of a shoulder strap used to take field samples and conduct quick analysis of a variety of substances. Sampling kits are available for soil, minerals, plants and gas (atmosphere).

Item	TL	Kg	Cost
Sampling Kit	10	4	Lv1200

Spotting Scope

A spotting scope is a small optical telescope used for terrestrial viewing. It is intended to be used on a tripod but does include optical stabilisation for free-hand work. It does not have the thermal imaging capabilities of standard binoculars, although that is an option. Magnification is between 10x and 120x. It is possible to attach an imager to a spotting scope, turning it into a super-telephoto lens.

Item	TL	Kg	Cost
Spotting Scope	8	2.5	Lv200
Spotting Scope w/Thermal Imaging	9	2.7	Lv400

StarScope

The Danforth Optics StarScope is a light-weight Newtonian reflector telescope, designed for astronomical viewing. It includes a powered mount that can be connected wirelessly to any nanocomp or portacomp and is used to find stars automatically. The metabase that comes with the scope includes information for use on any inhabited world and the

included software can learn new worlds based on known bright stars. Stars can be viewed through the optical eyepiece or piped wirelessly to the controlling comp. The sensor is extremely light-sensitive and can easily burn out if used in daylight. However, it can resolve stars that the eye cannot.

Item	TL	Kg	Cost
StarScope	11	8	Lv500

Super Conducting Electromagnetic Radiation Sensor (SCEMRS)

The Hyde Dynamics AN-99 Super Conducting Electromagnetic Radiation Sensor (SCEMRS or 'Schemers') is an extremely sensitive sensor designed to pick up the faint electromagnetic emissions of

modern electrical and electronic equipment. High-powered emissions, like the spark plugs in internal combustion engines, gauss weapon fire and electronic communications equipment can be detected from several kilometres away. A portable SCEMRS unit has a range of five kilometres.

Weapons and equipment can be shielded against SCEMS detection. The cost of this is Lv5000 + double the cost of the weapon or device. It is a straight forward matter to shield most electronics but teams that wish to be truly stealthy use no electronic devices of any sort, lest they give themselves away.

Item	TL	Kg	Cost
SCEMRS	11	5	Lv12000





INDUSTRIAL EQUIPMENT

While most colonies were started with the goal of resource extraction and exploitation, over time most colonies try to obtain at least some industrial capability in building towards greater self-sufficiency. While this is not always to the benefit of the founding nation, there is little that can be done to stop them aside from enforcing some very draconian rules. While the largest corporations benefit from being able to buy resources and sell finished goods on the Frontier, there are other corporations whose business model is founded on

giving colonies the tools they need to grow and providing them support as they move forward. The Libertines are also instrumental, in allowing colonies to bypass national and TransNat shipping concerns and provide trade between colonies.

The tools and technologies presented in this section are predominately light industrial gear, the sort that Travellers would have access to on a colony world or on a ship. Much of this equipment is as useful in the field as it would be in a workshop.

PORTABLE POWER AND LIGHTNING SYSTEMS

Portable power and fuelling systems are critically important for scientific, survey and colonial pathfinder expeditions. Powerful artificial lighting becomes even more important on worlds that vary greatly from the 24-hour day that humans are accustomed to.

PORTABLE POWER

Portable power supplies can be used for camps and remote sites but are not designed to run for extended periods of time.

Power Requirements

Power output and requirements are defined as Light, Medium, and Heavy. Light power requirements could include a small survey or mining camp and up to a few small houses. Medium power requirements could include several average homes or a light machine shop. Heavy power requirements would include light industrial uses, like small-scale industrial facilities, along with small neighbourhoods of conventional housing. Larger industrial requirements are out of scope for this chapter.

Gas-fired Generator

A gas-fired generator is a Stirling-cycle engine that can burn just about anything as fuel but is optimised for natural gas and hydrogen. This engine is connected to a generator and the output depends on size. There are several models available, categorised by their ability to produce Light, Medium or Heavy power. A full load of fuel is good for five days in any model. External tanks can be added, which are 50% the size and 10% of the cost of the generator itself. Medium and Heavy models are usually mounted on vehicles or on trailers to make moving them easier.

Item	TL	Kg	Cost
Gas-Fired Generator, Light	9	100	Lv200
Gas-Fired Generator, Medium	10	500	Lv2000
Gas-Fired Generator, Heavy	10	2500	Lv5000
Trailer	9	200	Lv800

Fuel Cell

The portable fuel cell is used to provide power in wilderness situations and is frequently used in concert with the fuel station. The fuel cell runs for 12 hours on a full load and provides Light power. The water produced by the fuel cells is normally just drained away but can be captured and purified for use as drinking water.

Item	TL	Kg	Cost
Fuel Cell	10	25	Lv1000

Fuel Station

A fuel station is a solar-powered processor that produces electricity from sunlight and then uses it to crack water into hydrogen for vehicle fuel. The complete station consists of a central unit containing four fuel cells and 10 solar panels. A tank in the unit holds water, which the fuel cells crack into fuel. A set of composite tanks holds the hydrogen gas under high pressure, while waste oxygen is typically vented off.

Each solar panel unfolds into a flat square measuring 10 x 10 metres. In sunlight (of average intensity in the life zone), each panel generates four hours of fuel for a small ground vehicle or two hours for a large ground vehicle, per day of operation. For all other vehicle types, this amount is halved, while aircraft must halve it yet again.

The fuel station can also be used to directly provide the equivalent of Medium power but while it is doing so it cannot be used to crack fuel.

Item	TL	Kg	Cost
Fuel Station	11	220	Lv3500

Portable Vertical Windmill

A portable vertical windmill is stored and transported folded up and is then unfolded for operation. One of these windmills, with a steady wind of at least 8 kilometres per hour, can produce Light power for as long as the wind blows. They are often used by prospectors and in new homesteads.

Item	TL	Kg	Cost
Portable Vertical Windmill	9	80	Lv1200

Solar Panel

The solar panels included with the fuel station are also available individually. These panels can be chained together to provide power for a base or small station. An individual solar panel is useful for recharging personal electronics but little else. Four such solar panels, however, would provide the equivalent of Light power, although only during daylight hours.

Item	TL	Kg	Cost
Solar Panel	11	20	Lv300

Storage Bank

A storage bank is a collection of reconfigurable batteries used to store energy from a power production system, typically a bank of solar panels or a windmill. Each bank takes eight hours of Light power to charge and can then produce Light power for six hours. Four storage banks charged by four solar arrays generating Light power can provide either Light power for 24 hours or Medium power for six hours.

Item	TL	Kg	Cost
Storage Bank	10	50	Lv500

HAND LIGHTING

Chemlights use binary chemicals that, when mixed, emit light for up to 12 hours. Most are activated by bending them and then giving a shake to mix the chemicals. Chemlights are available in a wide range of colours and styles, including glowpatches and glowsticks. Chemlights work equally effectively underwater or in deep space and will do so as long as the chemicals do not freeze.

Glowpatch

Glowpatches are small square patches, five centimetres on a side. They have an adhesive backing that is activated as soon as the light is and can be applied just about anywhere. They emit a green, red or yellow light, depending on the formulation, out to about three metres.

Item	TL	Kg	Cost
Glowpatch	9	—	Lv2



Portable Vertical Windmill

Glowsticks

Glowsticks are about 20 centimetres long, although a wide variety of sizes and shapes are available. They emit a soft glow that illuminates their surroundings in a radius of 1.5 metres from the stick.

Item	TL	Kg	Cost
Glowsticks	9	15	Lv1

Hand Torch

The hand torch, or flashlight, is available in dozens, if not hundreds, of different sizes and models. It emits a cone of bright light 15 metres long x two metres across. A typical torch will have batteries that allow for 20 hours of continuous operation.

Item	TL	Kg	Cost
Hand Torch	8	0.5	Lv15

Head Lamp

A small electric torch that is attached to the head or helmet, allowing hands-free work. The battery pack lasts for 12 hours. It emits bright light in a cone six metres long x 0.5 metre across.

Item	TL	Kg	Cost
Head Lamp	9	0.25	Lv20

Lantern

Instead of the highly directional beam of a torch, lanterns illuminate an entire area. They can be used to brightly illuminate an area up to 10 metres in radius. The battery pack in the base lasts for 36 hours before needing a recharge.

Item	TL	Kg	Cost
Lantern	11	0.5	Lv30

Spotlight

The hand-held spotlight can illuminate an area three metres across at ranges of up to 50 metres. Within 10 metres, the light from a spotlight can temporarily blind

a person. Roll to attack and, on a successful hit, the target must make a Routine (8+) DEX check to avoid being blinded. If this check is failed, the Effect indicates the number of rounds the target is blinded and suffering DM-4 to all checks requiring sight. The battery lasts for eight hours before needing a recharge.

Item	TL	Kg	Cost
Spotlight	8	2	Lv45

Tactical Flashlight

Tactical flashlights are small torches designed to attach to the accessory rail on a military weapon or helmet. With a tactical flashlight, a soldier can see whatever they aim at, negating lighting penalties for the range of the torch. The tactical flashlight emits a relatively narrow beam of light with a range of 20 metres and the maximum width is 1.5 metres. The battery on the tactical flashlight will last for 10 hours of constant use.

Item	TL	Kg	Cost
Tactical Flashlight	11	0.25	Lv50

OUTDOOR LIGHTING SYSTEMS

Day and night cycles on Frontier worlds can be very different from earth and depend on a number of factors including brightness and distance from the local star, the presence of companion stars, world size, axial tilt, presence or absence of moons, and average cloud cover. Outdoor lighting systems allow work to continue and are very common in field camps, survey bases and construction sites.



Area lights

Area Lights

Generally equipped with their own generator carts, area lights use a dozen very powerful white-light emitters to cast light over a large area. Each one requires a dedicated Light power supply, although up to 10 can operate from a Medium power supply. Area lights produce bright, workable light in a cone 100 metres long by 200 metres wide.

Item	TL	Kg	Cost
Area Lights	9	500	Lv5000

Searchlight

In contrast to work and area lights, searchlights are very focused, working more for range than area. Like area lights, searchlights require a dedicated Light power supply. The beam is 500 metres long by only 10 metres wide. It is painfully bright to look at and can cause temporary blindness. A Traveller must make an Average (8+) DEX check to avoid looking at a searchlight that passes across them.

Infrared searchlights are also available. These are invisible to the un-augmented human eye (although some animals, both terrestrial and alien can see it) and require low-light sights or goggles to see. Infrared searchlights have the same range as conventional searchlights and can blind creatures (but not humans with infrared scopes or googles; they have flash protection).

Item	TL	Kg	Cost
Searchlight	8	500	Lv5000
Searchlight, IR	9	600	Lv8000



Searchlight

Work Lights

Work lights require an external power source but are designed as portable units to move from location-to-location on a job site or spacecraft. They brightly illuminate a large area and can hang from available hooks or else sit on the included extendable tripod. Work lights require at least a Light power supply, which can run up to 20 of them at once. They produce bright, workable light in a cone 20 metres long by 20 metres wide.

Item	TL	Kg	Cost
Work Lights	9	3	Lv30

VEHICLES AS POWER SOURCES

Most ground vehicles on the frontier have electric drivetrains that operate off an internal power supply or generator. Sometimes this power supply is a gas turbine or Stirling-cycle engine, burning fuel to run the generator. All such vehicles can also be used to provide power for a camp or residence.

- **Light vehicles** (<20 Spaces) can function as Light power sources for a number of hours equal to remaining Range divided by 100.
- **Heavy vehicles** (>20 Spaces) can function as a Medium power source for a number of hours equal to their remaining range divided by 50.
- **A sea-going ship** of 100 Spaces or more can function as a Heavy power source for a number of hours equal to remaining range divided by 20.

FUELLING VEHICLES

Fuel cell vehicles require hydrogen as fuel, taking oxygen from the surrounding atmosphere. For vacuum operations it would carry oxygen as well. A gas turbine or MHD turbine can run on almost any combustible liquid or gas with a little work, while a typical Stirling-cycle is designed to burn *everything*. They can even run off solid fuel, like wood or coal. Natural gas (methane) is readily-available on most colony worlds with only minimal infrastructure requirements and is the most common fuel type after hydrogen.

PORTABLE POWER TOOLS AND INDUSTRIAL EQUIPMENT

These tools are commonly available in the 24th century, especially on the Frontier.

Basic Hand Tools

There are a large number of basic hand tools that are not powered, yet still essential in many fields and practices. Many of these kits are provided to new colonists by the colonial government as part of a start-up pack.

Basic Tool Kit

This kit includes small hand tools suitable for a variety of purposes, including wrenches, pliers, screwdrivers and so on.

Item	TL	Kg	Cost
Basic Tool Kit	10	5	Lv250

Construction Tools

A construction tool set contains hammers, saws, squares, hatchets, chisels and other woodworking tools.

Item	TL	Kg	Cost
Construction Tools	5	30	Lv100

Excavating Tools

A set of excavating tools includes picks, shovels, mattocks and other such tools. None of these are powered in any way. These tools allow loose soil to be moved at a rate of about three cubic metres per hour.

Item	TL	Kg	Cost
Excavating Tools	3	20	Lv200

Gunsmith Tools

These specialised tools allow maintenance and modifications to chemically-propelled firearms, including binary-propellant weapons, but not gauss or energy weapons. Those require electronic tools.

Item	TL	Kg	Cost
Gunsmith Tools	10	2	Lv500

Basic hand tools



Vehicle Maintenance Tools

These are specialised tools used for repair and maintenance of vehicles, such as torque wrenches, grease guns, engine and fuel cell calibration tools, and other specialised tools. Use of these tools grants DM+1 to Mechanic checks involving vehicles or aircraft but not spacecraft.

Item	TL	Kg	Cost
Vehicle Maintenance Tools	10	10	Lv400

Advanced Tools

Advanced tools include powered tools, along with advanced tool kits for electronics and other specialised repair tasks.

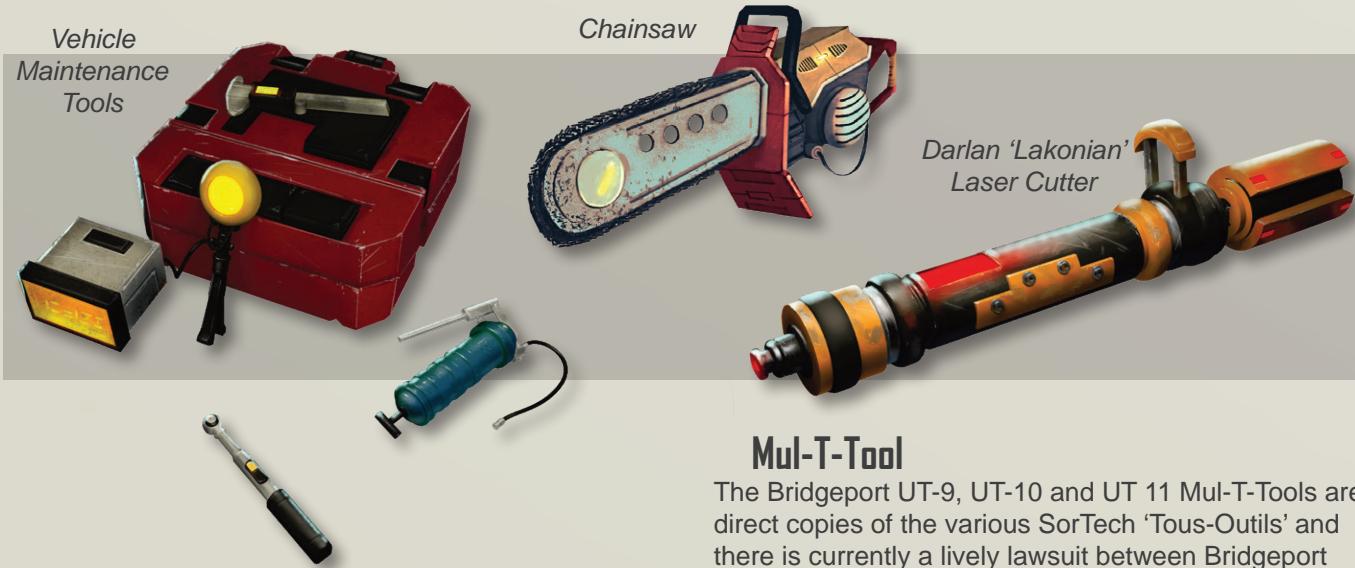
Chainsaw

In contrast to the chainsaw included in the power tools kit, with its 18 centimetres bar, the Havarna LJ-80X heavy duty chainsaw is fitted with an 80 centimetres bar, suitable for felling most medium-sized trees. Anything bigger would require specialised tools or something like the Ratatosk forestry walker.

The battery on the LJ-80X is not compatible with the battery packs of the power tools kit. This saw requires a much more powerful battery.

Weapon	TL	Range	Damage	Kg	Cost	Magazine	Magazine Cost	Traits
Chainsaw	10	—	5D	15	Lv800	30 minutes	Lv50	AP 10, Bulky
Cutter Bar	11	—	3D	3	Lv250	20 minutes	Lv10	AP 2

Item	TL	Kg	Cost
Replacement Battery (Chainsaw)	10	2	Lv50
Replacement Battery (Replacement Battery)	11	0.5	Lv10



Cutter Bar

The Pichot JK90 cutter bar is a brush clearing tool, much like a very powerful hedge trimmer, with smaller, sharper teeth. While it can do gruesome damage, it is unwieldy, as it was designed as a tool rather than a weapon, and so suffers DM-2 to attack rolls.

Darlan 'Lakonian' Laser Cutter

The Lakonian must be connected to a Medium or better power supply. It is capable of cutting one metre of hardened steel, up to 15 centimetres thick, in one minute.

Item	TL	Kg	Cost
Laser Cutter	11	6	Lv1200

Electronic Repair Tools

Electronic repair tools are specialised tools for work on electronic and photonic equipment, as well as gauss and energy weapons. Electronic repair tools must be of the same Tech Level of the item being repaired or higher.

Item	TL	Kg	Cost
Electronic Repair Tools	11	3	Lv1000

Mul-T-Tool

The Bridgeport UT-9, UT-10 and UT 11 Mul-T-Tools are direct copies of the various SorTech 'Tous-Outils' and there is currently a lively lawsuit between Bridgeport and SorTech.

Most vehicle and heavy-equipment manufacturers in the Core use the very limited array of fasteners supported by the Mul-T-Tool. For work on vehicles from these manufacturers, a mechanic need not have several different types of tools; they need only a Mul-T-tool. This is a self-powered unit with a flexible head that automatically adjusts to fit the fastener size. Mul-T-tools come in three gauges for three ranges of fastener sizes. Light vehicles only need the smallest gauge, while heavy vehicles require all three. A Mul-T-Tools grants DM +1 to Mechanic checks made for repairs on compatible vehicles

Item	TL	Kg	Cost
Mul-T-Tool, Light	11	0.5	Lv180
Mul-T-Tool, Medium	11	1	Lv260
Mul-T-Tool, Heavy	11	1.5	Lv350
Replacement Battery	11	0.25	Lv10

Nail Gun

Using magnetic accelerator technology similar to a gauss weapon, the electromagnetic nail gun is used to drive long nails quickly and accurately. Nail guns

can even be used to join wood, synthetic and metal structural material to concrete using special nails. Use of a nail gun reduces construction times required by a quarter. It is possible to override the safety mechanism on a nail gun, turning it into a low-powered, short-ranged, wildly inaccurate gauss gun (Range 5 metres, Damage 1D-1, DM-2 on attacks rolls). Electromagnetic nail guns are illegal in Manchurian and Incan colonies.

Item	TL	Kg	Cost
Nail Gun	11	2	Lv400

Power Hand Tool Kit

This kit includes a selection of rechargeable power tools, including a chainsaw, jigsaw, rotary saw and drill, as well as other small electrical tools, all organised into a rigid kevlex carrying case. The case can be used to convert the hand tools into stationary tools, including a table saw, scroll saw and drill press. These kits normally come with two rechargeable battery packs but spares can also be purchased. There must be an electrical power source to recharge the batteries. A battery pack typically lasts for five hours of continuous use before needing to be recharged.

Item	TL	Kg	Cost
Power Hand Tool Kit	10	35	Lv450
Replacement Battery	10	0.5	Lv20

Powered Opener

The opener is designed to force open locked or jammed doors, including airlocks. It is ineffective against heavy security doors and vaults, however. It takes 2D rounds to set up and will then open a door in 1D rounds. The internal power pack contains enough power to force open 10 regular powered doors or five airlock doors. It can open welded or forcibly-jammed doors as well, although the internal battery only has enough power to open one or two doors stuck in this fashion.

Item	TL	Kg	Cost
Powered Opener	11	15	Lv900

Powered Shears

These shears are massive hydraulic cutters that can eventually force their way through steel beams up to 40 centimetres thick. They require an external power source of at least Medium capacity.

Item	TL	Kg	Cost
Powered Shears	10	15	Lv1500

Powered Shears



Rescue Jaws

Rescue Jaws

Combining a powered opener with powered shears, the rescue jaws are used by SAR techs to quickly cut and force their way into vehicles and ships. They require an external power supply of at least Medium capacity.

Item	TL	Kg	Cost
Rescue Jaws	10	22	Lv4500

SorTech Badger Mini Excavator

Tools like the Badger are popular with survey crews and other explorers. It consists of a small power shovel on the end of a hydraulic arm and a main body which includes a place for the operator to stand while in use. It can trundle about on a set of small tracks but is slower than walking speed.

The Badger can shift up to 30 cubic metres of loose dirt or gravel per hour and is often used to run lines in a camp for water, sewage, power and data, burying them safely out of the way.

Item	TL	Kg	Cost
Mini Excavator	10	22	Lv4500

Trilon Inc. 'Terminus' Plasma Cutter/Welder

The Terminus is a small hand-held unit, complete with built-in eye-shield that is commonly used for emergency cutting or welding in field conditions. Military units issue one unit per squad. It is powered by a compact LMS power cell, which provides enough power for five minutes' worth of cutting or welding. The

Terminus can cut through 50 centimetre of hardened steel, up to 4 centimetre thick, in one minute. Welding is somewhat quicker and requires welding rods in addition to the Terminus hand unit itself.

Item	TL	Kg	Cost
Plasma Cutter/Welder	11	2	Lv800
Welding Rod	11	0.5	Lv10

Special Equipment

This equipment is state-of-the-art and usually only found for sale in the Core. If found on the Frontier, the price will easily be 5–10 times higher.

Baustoffe Technologies A5 Spinner

The spinner, often called a ‘spinnerette’ due to its similarity to how a spider spins its webs, is an offshoot of the development that led to the creation of the long-chain carbon nanotubes that comprise a Beanstalk. It uses shorter-chain nanotubes and embeds them in a material sometimes called ‘hypersilk’, a chemical similar to spider silk but stronger. As the hypersilk/nanotube composite is extruded from the spinner, it is mixed with a catalyst that causes it to instantly harden into a 0.1 mm line with an extremely high tensile strength. Under normal gravity, the line has a break weight of over five tons and a safe support weight of one ton. At the extrusion point the spinner has a crimper that provides a tab that can be gripped, as well as an enzymatic cutter that can sever the line. Care must be taken, however, when weight is being supported by spinner cable as soft materials (such as human flesh) can be easily cut due to the cable’s thinness. If stretched taut, the cable can inflict 3D damage. Each spinner can create up to two kilometres of cable.

Item	TL	Kg	Cost
Spinner	12	1	Lv3000

Stik-kit

While stik-kits are produced by an Australian corporation, Dynom, a division of Pichot Heavy Industries, the same technology is available in Europe under the brand name Gekkocott.

A stik-kit is a disposable adhesive patch about the size of a human hand, black on one side, various colours on the other. The black side is a rigid plastic sheet which when flexed activates the patch, and the coloured side becomes very sticky. Note that the stik-kit is not a conventional adhesive; rather, it utilises the van der

Waals force, much like a gecko (thus the European name). Stik-kits will adhere to almost anything, except PTFE plastics like Teflon, in almost any environment. A small electric charge deactivates the adhesive – a battery is included in the stik-kit for this purpose. Some variations on the material require a special chemical catalyst to release the adhesive rather than an electric charge.

Stik-kits can be used for anything from patching hulls to creating ladders or suffocating creatures. Each stik-kit patch has a colon-coded band that indicates its holding strength.

Colour	TL	Kg	Cost	Holding Capacity
Red	11	—	Lv20	10 g
Orange	11	—	Lv40	100 g
Yellow	11	—	Lv80	1 kg
Green	11	—	Lv160	10 kg
Blue	11	—	Lv320	100 kg
Violet	11	—	Lv640	1,000 kg
Black	11	—	Lv1000	10,000 kg

Fabricators

Fabricators use powdered metals and ceramics to rapidly ‘print’ out parts and models. The metals and ceramics are subjected to a chemical/heat curing process and are then ready to use. Although copies are not as strong as the original, the ability to produce any spare part while in the field makes them incredibly useful. Most vehicles sold on the Frontier come with a chip containing a complete set of specifications to allow practically any spare part to be created. Note that fabricators do not make complete devices, only individual parts or non-functional 3D models. It is possible to create all the parts of a more complicated device on the fabricator and then assemble it by hand. However, most fabricators have controls built into their firmware to prevent them from being used to make parts for weapons. Of course, military fabricators do not have these constraints and fetch very high prices on the shadow market. All starship workshops contain the equivalent of a portable fabricator.

Portable Fabricator

Possibly the most common type of fabricator, the portable fabricator is found in the hands of colonists and technicians throughout human space. The software and firmware controls on these models are the most restrictive, as they are large enough to turn out parts for assault weapons. Military fabricators are the same size

but lack the firmware restrictions. This model can create objects up 100 x 100 x 30 centimetres, sufficient for most replacement parts. It takes approximately 10–15 minutes to print out an average part this size. The refill packs will last for 1D+1 uses.

Item	TL	Kg	Cost
Portable Fabricator	10	220	Lv7500
Refill	10	20	Lv100

Small Fabricator

Suitable for making small parts and models, the small fabricator can create objects up to 15 x 15 x 15 centimetres. It takes approximately 2-3 minutes to print out an average-sized part on this device. The refill packs will last for D3 uses.

Item	TL	Kg	Cost
Small Fabricator	10	8	Lv100
Refill	10	0.75	Lv5

Trilon Inc. 'Prometheus' Industrial Fabricator

The largest of the commercial fabricators, the Prometheus uses a slightly different process than other models to turns out parts as strong as originals. It is somewhat more expensive to run and takes longer to create a part. Colonists often pool resources to provide one of these for an entire colony, as it can make nearly any part imaginable. Use of these devices is restricted by copyright law and the internal software tracks all the parts manufactured. Any misuse may be reported to the authorities or to the corporations whose copyrights have been violated. This model can create objects up 3 x 3 x 1 metres, sufficient for any replacement parts or even new equipment manufacture. The refills for this machine last for 2D parts and then must be replaced. The industrial fabricator requires dedicated power of Heavy capacity.

Item	TL	Kg	Cost
Industrial Fabricator	11	5000	Lv100000
Refill	11	200	Lv500

Explosives

Explosives have a wide variety of uses on the Frontier, largely in mining and construction. It should be noted that possession of explosives requires a license on most worlds and penalties for noncompliance are severe.

Binary Explosive: Binary explosives are related to the binary propellants found in some firearms. A charge consists of two separate chemicals, each stable on their own but when mixed become incredibly volatile and need only a spark, or even sudden motion, to set them off.

Cataclysmitre

Cataclysmitre uses nanofabrication to create a tertiary explosive of incredible power. It requires a plasma arc detonator to initiate the explosion, however, and is so stable that it can be shipped anywhere, by any means. The plasma arc detonator cap requires a high-intensity power source like an LMS cell.

Det-Cord

Det-cord is a stabilised plastic explosive extruded in a five millimetres diameter cable of only moderate structural strength. It is often used in rapid clearance and demolition, where several separate lengths of the cord can be wrapped around an object and then detonated simultaneously. Values below are per 10 metre length of cord.

Dynamite

On less-advanced worlds, old-fashioned dynamite, which is relatively easy to manufacture, is produced for local use.

Plastique-9

The most prevalent non-combat explosives in the 24th century are industrially-produced blocks of plastic explosive and the most common variety is Plastique-9. Multiple blocks can be used together to create larger explosions or a single block can be broken down to a fragment for smaller blasts.

Weapon	TL	Range	Damage	Kg	Cost	Traits
Binary Explosive	11	—	5D	1	Lv500	AP 15, Blast 10
Cataclysmitre	12	—	8D	1	Lv1000	AP 15, Blast 15
Plasma Arc Detonator	12	—	—	0.25	Lv50	—
Det-cord	9	—	2D	0.5	Lv150	AP 10, Blast 1
Dynamite	4	—	2D	1	Lv50	Blast 12
Plastique-9	9	—	3D	1	Lv200	Blast 10

Protective and Industrial Wear

The jobsite can be a dangerous place, whether that is a factory, mine or industrial kitchen. Even with modern fail-safes, machinery and heavy equipment still presents a serious danger. Add to that the environmental hazards on a work-site and the need for protective equipment becomes paramount.

Hard Hat

The hard hat is common protective gear worn at most industrial workplaces, including farms and mines. It includes hearing and eye protection.

Item	TL	Kg	Cost
Hard Hat	10	1	Lv100–Lv200

Heavy Boots

Heavy boots with metal or ceramic protective inserts. Suitable for use at most industrial job sites. The Protection offered by the boots is not added to a Traveller's overall armour Protection.

Item	Protection	TL	Kg	Cost
Heavy Boots	+3	10	—	Lv80–Lv300

High Visibility Clothing

Brightly-coloured and highly reflective panels make clothing with this addition easy to spot, day or night. Wearing either grants DM+4 to Recon checks to be spotted or DM-4 to Stealth checks.

Fire Suit

In many conditions, firefighters will use hostile environment suits while fighting a fire, or even walkers when the need arises. However, in most common situations, they wear the fire suit. Armour is minimal, but provides protection against fire conditions of up to 600°. The built-in life support and heat sinks will last for about 30 minutes, with an outside safety envelope of an additional 15 minutes.

Hostile Environment Suit

A hostile environment suit is a close-fitting, flexible environment suit, much like the softsuits used in vacuum environments but with added protective material designed for use in particularly hostile environments (such as corrosive atmospheres or radiological and toxic environments). It is not intended for use in vacuum. The helmet is solid, with audio and visual sensors linked to helmet monitors. The suit has a battery-powered life support system to provide breathable air and a stable temperature. Life support duration is normally eight hours, but with bottled oxygen this can be extended to 20 hours (the maximum battery life).

Welding Gear

Welding gear includes a protective face shield with auto-darkening eye protection, shoulder-length gauntlets and a heavy kevlex protective apron.



Armour Type	Protection	TL	Rad	Kg	Cost	Required Skill
High Visibility Clothing	—	10	—	0.5	+Lv20	None
Welding Gear	+3	8	—	6	Lv300	None
Fire Suit	+2	10	—	12	Lv2000	None
Hostile Environment Suit	+4	10	500	20	Lv6000	Vacc Suit 0

ROBOTS AND DRONES

Even on the Frontier, robots and drones are vital components of local economies. Given the chronic worker shortages suffered by most colonies, robots fill in the gaps. They are important in many industries requiring brute force, repetitive work or work in hazardous environments.

Robots are commonplace enough that they will be in the background of almost any colony on the Frontier. From crop spiders on industrial farms to Rosies in restaurants, they are everywhere and well-accepted by most, in the same way that appliances and power tools are accepted.

The exception to this general rule are dolls, which can pass as human to a casual observer and some pass even after extended conversation. People tend to get angry or embarrassed if they do not detect a doll immediately and tend to react poorly to them. Dolls are rarely seen outside of their workplaces, which tend to be bars and comfort houses.

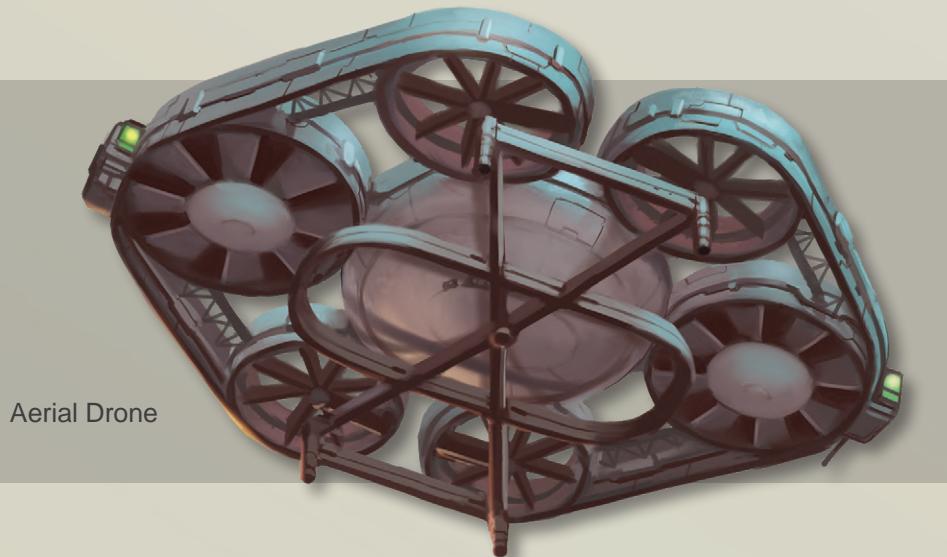
Drones

Drones are remote-operated vehicles and possess little to no capability to act on their own. Vehicle drone racks are designed to be used with a number of standardised drones. Aquitaine is the premier supplier of drone racks and drones, so aftermarket drones are designed to fit their racks.

Aerial Drone

While Aquitaine makes an aerial rack drone, the most popular is the Kākapowai from New Zealand's SouthPac Aerospace.

Robot	Hits	Speed	Cost
Kākapowai	1	5 m	Lv6200
TL	11		
Locomotion	VTOL		
Skills	Recon 1		
Attacks	—		
Manipulators	—		
Endurance	24 hours		
Traits	Armour (+3), IR Vision, Small (-4)		
Programming	Drone (INT 0)		
Options	Audible Sensor, Drone Interface, Encryption Module, Geiger Counter, Recon Sensor (improved), Thermal Sensor, Transceiver 5 km (improved), Visual Spectrum Sensor, Voder Speaker, Wireless Data Link		



Space Drone

While using the standard Aquataine rack design, Hyde Dynamics created the Bantam, a more feature-rich space drone to compete with the Aquataine Alouette.

Robot	Hits	Speed	Cost
Bantam	1	6 m	Lv6200
TL	11		
Locomotion	Thruster		
Skills	Recon 1		
Attacks	—		
Manipulators	2 x (STR 1 DEX 7)		
Endurance	2 hours		
Traits	Armour (+3), Small (-4)		
Programming	None or Drone (INT 0)		
Options	Audible Sensor, Drone Interface, Encryption Module, Geiger Counter, Light Intensifier Sensor (basic), Recon Sensor (improved), Transceiver 500 km (enhanced), Vacuum Environment Protection, Visual Spectrum Sensor, Voder Speaker, Wireless Data Link		



Space Drone

Underwater Drone

The Minnow-3 underwater drone from Aquataine Aqua is designed for use with standardised drone racks.

Robot	Hits	Speed	Cost
Minnow-3	1	3 m	Lv12000
TL	11		
Locomotion	Aquatic		
Skills	Recon 1		
Attacks	—		
Manipulators	2 x (STR 1 DEX 7)		
Endurance	72 hours		
Traits	Amphibious, Armour (+3), Heightened Senses, IR Vision, Small (-4)		
Programming	Drone (INT 0)		
Options	Amphibious Environment Protection, Audible Sensor, Drone Interface, Encryption Module, Geiger Counter, Recon Sensor (improved), Thermal Sensor, Transceiver 5 km (improved), Visual Spectrum Sensor, Voder Speaker, Wireless Data Link		



Underwater Drone

Sensor Drones

Sensor drones are remote eyes and ears for professionals including farmers, surveyors and law enforcement. There is a strong sentiment against the use of drones by law enforcement on the frontier, except for search and rescue, and fugitive pursuit. Most people do not like the idea of drones being used to watch them. For many, that was a large part of the reason they left the Core, to get away from ubiquitous surveillance.

Flying Disk Camera Platform

The Aquitaine V10 flying disk is a fast little flyer, equipped with a pair of high-speed cameras. It is very manoeuvrable and effectively disposable. A survey robot carries eight of these devices, which act as eyes and ears in areas where the robot cannot, or should not, go.

Robot	Hits	Speed	Cost
V10 Flying Disk	1	5 m	Lv14000
TL	12		
Locomotion	VTOL		
Skills	Recon 1		
Attacks	—		
Manipulators	—		
Endurance	24 hours		
Traits	Amphibious, Armour (+4), Flyer (idle), Heightened Senses, Heightened Senses, IR Vision, Small (-4)		
Programming	None or Drone (INT 0)		
Options	Amphibious Environment Protection, Audible Sensor (broad spectrum), Environment Processor, Hostile Environment Protection, Light Intensifier Sensor (advanced), Recon Sensor (basic), Thermal Sensor, Transceiver 50 km (enhanced), Visual Spectrum Sensor, Voder Speaker, Wireless Data Link		

Hazmat Drone

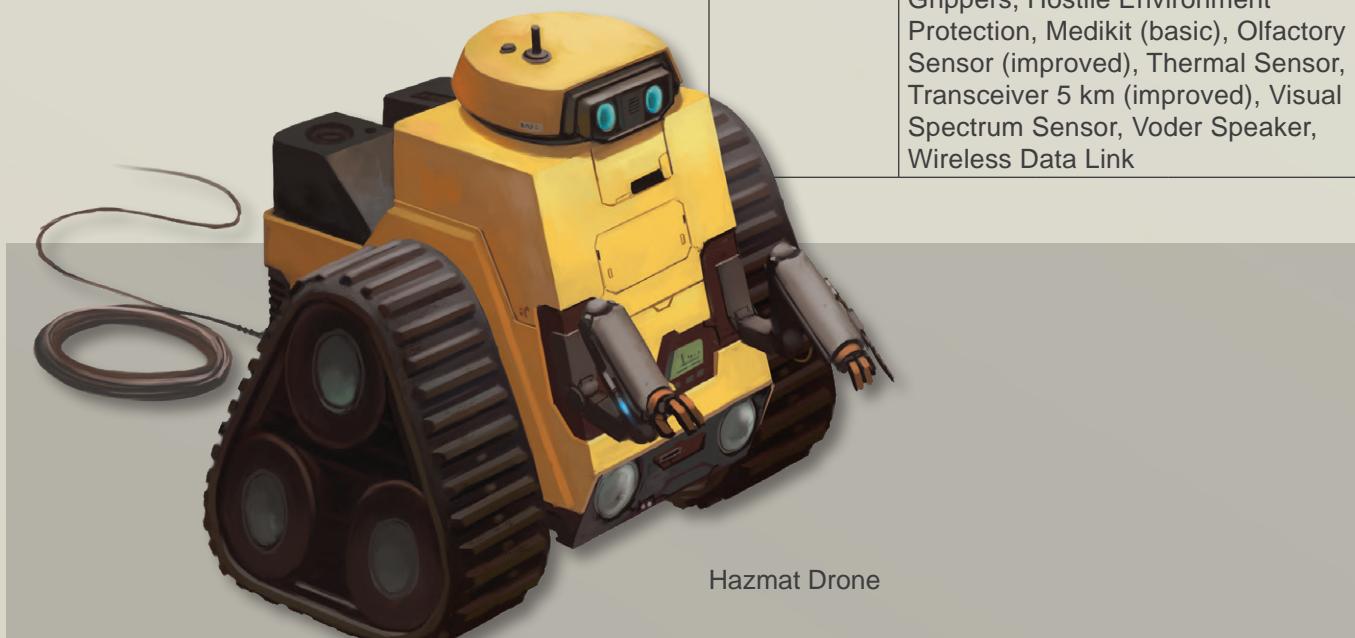
The Steadman Industries HMH-5 hazmat drone is a remote-operated vehicle meant to go into harm's way. Variations of this design are also used for explosive ordnance disposal (EOD), nuclear reactor work and toxic spill cleanup. To avoid interference, the drone is controlled by fibre-optic cable back to a computer or gauntlet. Each drone carries a spool of 500 metres of cable, which is about the thickness of standard fishing line. This cable is the drone's greatest weakness, as it can become caught up or cut by debris. It has a back-up radio controller, which has never proven very effective, especially in radiological environments.

Robot	Hits	Speed	Cost
HMH-5	20	4 m	Lv88000
TL	11		
Locomotion	Tracks		
Skills	—		
Attacks	—		
Manipulators	2 x (STR 9 DEX 7)		
Endurance	72 hours		
Traits	Armour (+3), ATV, Heightened Senses, IR Vision		
Programming	None		
Options	Atmospheric Sensor, Audible Sensor, Corrosive Environment Protection, Cutting Tool, Construction Equipment (small), Drone Interface, Environment Processor, Fibre-Optic Cable (500 m), Geiger Counter, Insidious Environment Protection, Light Intensifier Sensor (advanced), Radiation Environment Protection, Scientific Toolkit (basic), Seismic and Engineering Toolkit, Transceiver 5 km (improved), Visual Spectrum Sensor, Voder Speaker, Wireless Data Link		

Herd Drone

The herd drone is a small LTA (Lighter Than Air) drone that drifts around herds of livestock to monitor their condition and surroundings. It is little more than a floating camera with a high resolution thermal imager, which helps to monitor animal health and also enables the drone to spot predators or other threats at night. The herd drone is very similar to the surveillance drones used back in the Core and is based on the same basic chassis. It is not quite as capable but in a pinch makes for a passable surveillance unit.

Robot	Hits	Speed	Cost
Herd Drone	1	5 m	Lv5400
TL	12		
Locomotion	LTA		
Skills	—		
Attacks	—		
Manipulators	—		
Endurance	48 hours		
Traits	Armour (+4), Flyer (idle), Heightened Senses, IR Vision, Small (-4)		
Programming	None or Drone (INT 0)		
Options	Audible Sensor (broad spectrum), Drone Interface, Lift Envelope, Olfactory Sensor (improved), Thermal Sensor, Transceiver 5 km (improved), Visual Spectrum Sensor, Voder Speaker, Wireless Data Link		



SAR Drone

The SAR drone is an example of a snake bot, a multi-segmented device able to work its way through crevices, small tunnels, wreckage and collapsed buildings to find survivors. It is capable of providing limited first aid, running communications lines, setting up emergency transponders and even providing emergency life-support, food and water. It is not a large machine, however, and best used in the Search portion of Search-and-Rescue operations. A SAR team will typically deploy a dozen or more of these at a rescue scene, allowing them to use their array of sensors, including olfactory, thermal and sound, to ferret out anyone trapped, whether in a building, mine collapse or even an avalanche, as the bots can dig through snow and loose dirt easily.

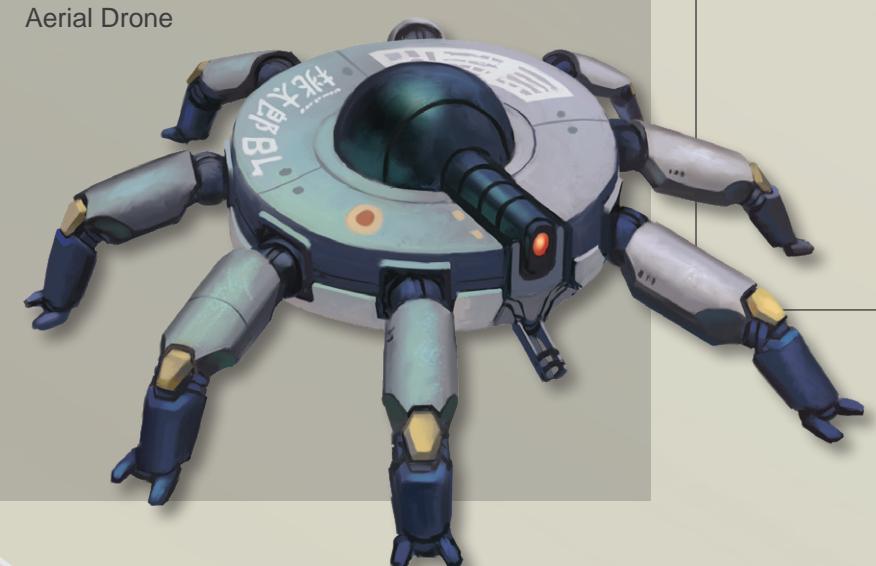
Robot	Hits	Speed	Cost
SAR Drone	1	4 m	Lv16000
TL	12		
Locomotion	Tracks		
Skills	Recon 0		
Attacks	—		
Manipulators	2 x (STR 1 DEX 7)		
Endurance	72 hours		
Traits	Amphibious, Armour (+4), ATV, Heightened Senses, IR Vision, Small (-4)		
Programming	None or Drone (INT 0)		
Options	Amphibious Environment Protection, Audible Sensor, Drone Interface, Environment Processor, Gecko Grippers, Hostile Environment Protection, Medikit (basic), Olfactory Sensor (improved), Thermal Sensor, Transceiver 5 km (improved), Visual Spectrum Sensor, Voder Speaker, Wireless Data Link		

Spider Drone

The Momotaro B4 spider drone is a small, eight-legged drone used by survey robots to get closer to ground areas of interest without risking the robot itself. The drone is primarily a sensor platform, with an array of visual, IR, UV and ground penetrating radar, along with basic auditory sensors. It also has a sampling arm able to collect small samples for return to the survey robot for analysis. All functions of the drone are controlled by the robot.

Robot	Hits	Speed	Cost
B4 Spider Drone	1	5 m	Lv14000
TL	12		
Locomotion	Walker		
Skills	—		
Attacks	—		
Manipulators	—		
Endurance	72 hours		
Traits	Amphibious, Armour (+4), ATV, Heightened Senses, IR Vision, Small (-4)		
Programming	None (Drone)		
Options	Amphibious Environment Protection, Audible Sensor (broad spectrum), Environment Processor, Hostile Environment Protection, Light Intensifier Sensor (advanced), Recon Sensor (basic), Thermal Sensor, Transceiver 50 km (enhanced), Visual Spectrum Sensor, Voder Speaker, Wireless Data Link		

Aerial Drone



ROV

The OceanTech SD-8 'Sandy' Deep ROV (Remote Operated Vehicle) is a self-propelled, torpedo-shaped device approximately two metres long and about a metre wide, with a variety of attached tools including lifting arms, oxygen tubes, cutting lasers and high-intensity search lights. An operator at a remote panel can control the robot from as far as five kilometres through a fibre-optic cable or 50 kilometres using an Ultra Low Frequency (ULF) radio. The bandwidth of ULF systems is low, so a drone being controlled this way suffers DM-2 to all checks. The ROV has video, infrared and sonar sensors and a broadcaster to relay images of its surroundings to the control panel and the panel also contains a sonar scanner to track the drone's position. Again, due to bandwidth restrictions using the ULF system, the drone can only relay still images every two seconds or so. ROVs are used for rescue operations and undersea operations in which conditions are too dangerous for direct human presence.

Robot	Hits	Speed	Cost
SD-8 ROV	14	3 m	Cr23000
TL	12		
Locomotion	Aquatic		
Skills	—		
Attacks	—		
Manipulators	2 x (STR 7 DEX 7)		
Endurance	72 hours		
Traits	Amphibious, Armour (+10), Heightened Senses, IR Vision, Seafarer, Small (-1)		
Programming	None or Drone (INT 0)		
Options	Amphibious Environment Protection, Audible Sensor, Drone Interface, Environment Processor, Fibre-optic Cable (5,000 metres), Geiger Counter, Hostile Environment Protection, Light Intensifier Sensor (advanced), Navigation System (basic), Olfactory Sensor (basic), Recon Sensor (improved), Transceiver 5 km (improved), Visual Spectrum Sensor, Voder Speaker, Wireless Data Link		

Robots

As opposed to drones, which require remote operation, robots do not need an operator, although they can be overridden and remote operated. Robots operate according to their software but have the ability to adapt and learn within the parameters of their mission directives.

Cleaner Robot

The Sistemas Domesticas CC-190, often called the 'Yellow Jack' for its high-visibility torso colours, is widely used in institutional settings across the Core and Frontier. It can handle most routine cleaning tasks at hospitals, office buildings, warehouses and similar buildings. It is also quite common on large, rotating space stations. Equipped with a power vacuum, floor scrubber and polisher, and attachments to clean everything from walls and lights to toilets and tubs, the Yellow Jack is extremely popular.

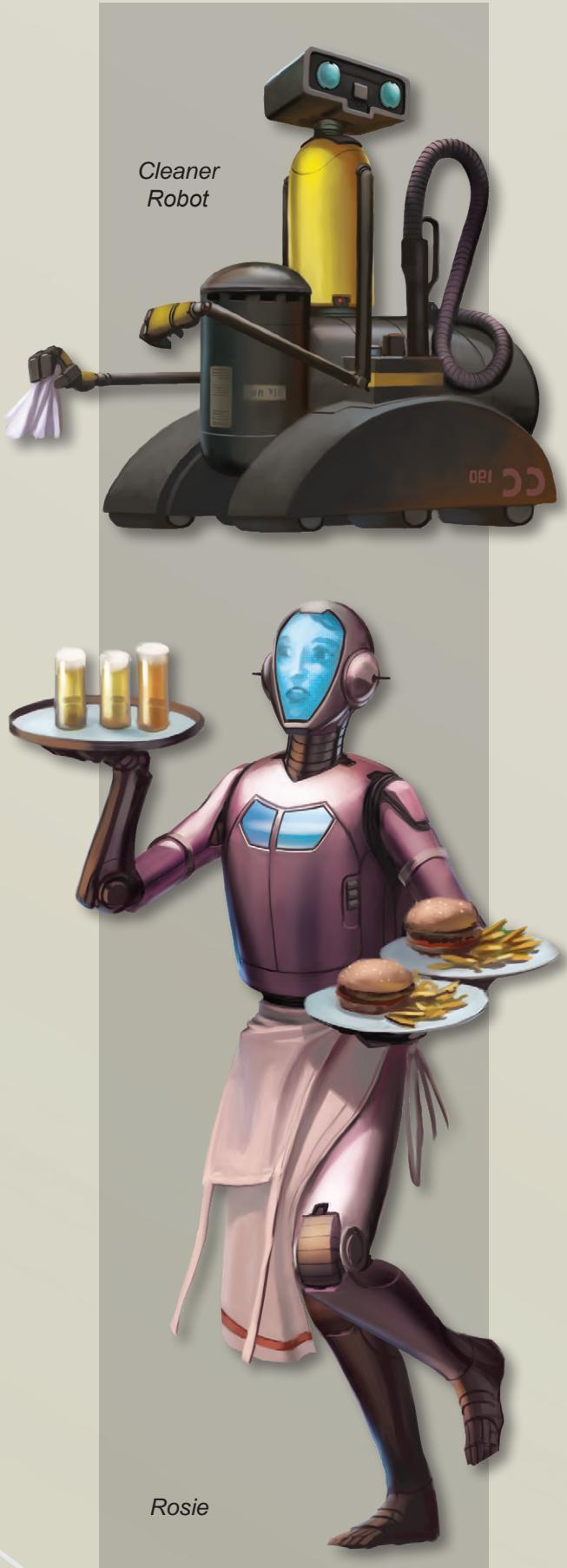
Robot	Hits	Speed	Cost
Yellow Jack	12	2 m	Lv20000
TL	12		
Locomotion	Wheels		
Skills	Mechanic 0, Profession (cleaner) 0, Steward 1		
Attacks	—		
Manipulators	2 x (STR 7 DEX 7)		
Endurance	216 hours		
Traits	Armour (+4), Heightened Senses, Small (-1),		
Programming	Basic (service) (INT 4)		
Options	Atmospheric Sensor, Audible Sensor, Drone Interface, Geiger Counter, Hostile Environment Protection, Industrial Cleaning Equipment (medium), Light Intensifier Sensor (basic), Olfactory Sensor (improved), Transceiver 5 km (improved), Visual Spectrum Sensor, Voder Speaker, Wireless Data Link		

Crop Spider

The Aquitaine Crop Spider v16 is a small semi-autonomous robot designed to travel through fields and crops, taking soil and plant samples, and looking for insects and parasites. It can perform basic tests with its on-board equipment, although for any sort of complex work it has to return samples to a more complete laboratory. The high-resolution cameras allow the spider to find and identify diseases and pests on plants and relay that information back to a control console, which could be a gauntlet or body comp, or a workstation in a vehicle, home or office. With some modification, crop spiders can be used to assist with harvesting labour-intensive crops like rice and quinoa. Additionally, like all such small robots and drones, the crop spider can be used as a surveillance robot. Its sensors and small size make it useful for observing targets in non-rural settings.

Robot	Hits	Speed	Cost
Crop Spider	1	5 m	Lv23000
TL	10		
Locomotion	Walker		
Skills	Investigate 0, Profession (farmer) 2, Recon 0		
Attacks	Stinger (1D)		
Manipulators	2 x (STR 1 DEX 7)		
Endurance	72 hours		
Traits	Armour (+4), Heightened Senses, IR Vision, Small (-4)		
Programming	Basic (labourer) (INT 4)		
Options	Agricultural Equipment (small), Audible Sensor, Drone Interface, Environment Processor, Light Intensifier Sensor (advanced), Olfactory Sensor (improved), Solar Coating (improved), Stinger, Thermal Sensor, Transceiver 50 km (improved), Visual Spectrum Sensor, Voder Speaker, Wireless Data Link		





Domestic Robot 'Rosie'

The Pichot Industries RS-10 domestic robot, often called a 'Rosie', can be used for most cleaning and cooking tasks, including bartending and commercial cooking. It is intended more for a commercial/institutional audience than private ownership, unlike the Systemas Domesticas robot (see page 94 of *2300AD Characters and Equipment*). A Rosie can keep track of, and perfectly deliver, up to eight meals at a time, while washing dishes in its belly and taking orders from nanocomps in the eating area. It has a factory-installed repertoire of 2,000 recipes, to which more can be added. It is also equipped with a learning program, so it can watch someone make a recipe and, with three repetitions, be able to repeat the recipe exactly.

It can also clean, wash clothes and take notes. Although Rosies are expensive, they are a common sight in bars and restaurants across the Frontier. Rosie can also be made without the internal washer system, in which case the chassis is much more humanoid, and for many restaurants and bars, the styling can be made quite 'sexy', in a very artificial way. Rosies are capable of talking and bantering with customers. The chassis is also available in a male-appearing version called a 'Jacques'.

Robot	Hits	Speed	Cost
Rosie	20	5 m	Lv93000
TL	11		
Locomotion	Walker		
Skills	Admin 1, Athletics (strength) 1, Carouse 0, Profession (domestic servant) 2, Recon 0, Stealth 2, Steward 2		
Attacks	—		
Manipulators	2 x (STR 9 DEX 7)		
Endurance	72 hours		
Traits	Armour (+3), ATV, IR Vision		
Programming	None or Drone (INT 0)		
Options	Audible Sensor, Autochef (enhanced), Camouflage: Audible (improved), Domestic Cleaning Equipment (large), Domestic Cleaning Equipment (medium), Drone Interface, Thermal Sensor, Transceiver 5 km (improved), Visual Spectrum Sensor, Voder Speaker, Wireless Data Link		

Mining Robot

The Somerset 'Moler' mining robot is an important contributor to most colonies, as these worlds typically lack the manpower to effectively exploit mineral wealth. The heart of the mining robot is the plasma borer, which focuses a stream of plasma to heat and soften the rock face while a more conventional drill head moves into it. A small deep-radar unit on the robot searches for flaws or pockets in the rock and adjusts the beam accordingly. While the beam is focused far too closely to be used as a weapon, the focus can be adjusted by skilled technicians to turn the borer into something like an extreme flamethrower, very destructive but difficult to aim.

TL	11
Skill	Drive (track)
Agility	-2
Speed (cruise)	Very Slow (Idle)
Range (cruise)	600 (900)
Crew	—
Passengers	—
Cargo	250 kg
Hull	72
Shipping Size	12 tons
Cost	Lv260760

Armour	
Front	17
Sides	7
Rear	5

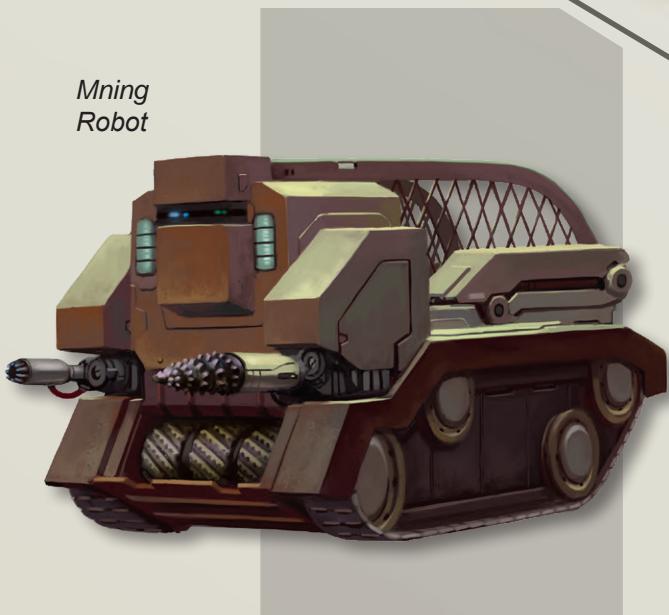
Traits	ATV Robot (Advanced +0), Skills: Drive (track), Profession (mining)
Equipment	Autopilot (basic), Control System (enhanced), Crane (medium), Digging Blade, Hostile Environment Protection, Plasma Borer, Seismic and Engineering Tools, Winch (heavy),
Weapons	—

Equipment

Autopilot (skill level)	+0
Communications (range)	—
Navigation (Navigation DM)	—
Sensors (Electronics (sensors) DM)	—
Camouflage (Recon DM)	—
Stealth (Electronics (sensors) DM)	—

Weapon	Range	Damage	Traits
Plasma Borer	10 m	2DD	AP 10, Auto 2

Mining Robot



Observation Robot

The Aquitaine D-5 Observation Robot is a small, battery-powered, rotor-driven aerial sensor. It incorporates a video imager with up to 5x magnification and thermal imaging for night vision and limited visibility in fog or smoke. The video imager outputs directly to a monitor and a video recorder at the controller station. The drone also includes a microphone for audio data and a large life-form detector as described on page 45. The drone has a limited free-flight capability, where it will fly semi-randomly until it sees or hears something that triggers a pre-programmed response. It can also be operated as a drone by a remote pilot.

Robot	Hits	Speed	Cost
D-5	1	6 m	Lv56000
TL	11		
Locomotion	VTOL		
Skills	Athletics (dexterity) 1, Navigation 1		
Attacks	—		
Manipulators	—		
Endurance	24 hours		
Traits	Armour (+3), Flyer (idle), IR Vision, Small (-4)		
Programming	Advanced (INT 7)		
Options	Atmospheric Sensor, Audible Sensor, Drone Interface, Laser Designator, Light Intensifier Sensor (advanced), Recon Sensor (enhanced), Transceiver 50 km (enhanced), Visual Spectrum Sensor, Voder Speaker, Wireless Data Link		

Security Robot

Unlike the Sortech FE-909, the Hyde Dynamics Vigilance is designed for lethal response. While supposed to be a strictly military design, many larger corporations have managed to procure some for perimeter security at highly secure, but remote, sites. Many colonial governments, or at least many politicians, turn a blind eye, as they often depend on tax revenue and/or kickbacks from the corporations.

The Vigilance is a two-legged walker, designed to go anywhere an average-sized person can go. It can climb, jump and crawl. As part of its security role, it is armed with a variety of weapons; along with the integral sonic stunner housed in its forehead, it also has a single-shot 30mm grenade launcher on its left



Security Robot

shoulder and most also carry a handheld weapon, with the Stracher MP-67 or Wu-Beijing Type-49 being the most common choices.

In addition to built-in equipment and weaponry, Vigilance robots are also equipped with the equivalent of a single aerial rack drone. This is controlled by the robot and used to extend its operational reach.

Robot	Hits	Speed	Cost
Vigilance	20	7 m	Lv100000
TL	12		
Locomotion	Walker		
Skills	Athletics (strength) 1, Gun Combat (slug) 1, Melee 0, Navigation 1, Profession (security) 1, Recon 3, Stealth 2, Tactics (military) 1		
Attacks	30mm Grenade Launcher (varies), MP-67, Punch (1D), Sonic Stunner (3D, Stun)		
Manipulators	2 x (STR 9 DEX 7)		
Endurance	58 hours		
Traits	Alarm, Armour (+12), ATV, Heightened Senses, IR Vision		
Programming	Advanced (INT 7)		
Options	Audible Sensor (broad spectrum), Camouflage: Audible (improved), Camouflage: Visual (advanced), Drone Interface, Drone Mount, Encryption Module, Fire Extinguisher, Hostile Environment Protection, Light Intensifier Sensor (advanced), Navigation System (basic), Recon Sensor (advanced), Transceiver 50 km (improved), Visual Spectrum Sensor, Voder Speaker, Weapon Mount (small), Weapon Mounts (medium) x2, Wireless Data Link		

A Survey Question

In the early years of exploration and survey, many colony worlds were the target of survey robots, which for their time were some of the most sophisticated robots ever made, with incredible processing power. They were built to last and with regular maintenance some still in operation are close to 80 years old.

After all the years of service, these robots have developed interesting ‘personalities’. Although a computer scientist will say that they are not true AI, to most they seem as fully intelligent as any human. There is a theory that due to a combination of their processing power and wide-ranging experience,

these robots represent a kind of emergent consciousness. Stories on some colony worlds talk of ‘pilgrimages’ to meet with wandering robots to get historic information on planetary conditions. Researchers on Crater and Syuhlam have sought out local survey robots but can never seem to be able to make contact with one, even a day after locals claim to have seen one.

If these survey robots are found to be emergent conscious beings, it will upset the whole field of computer science, a central tenet of which is that computers designed to be conscious will only operate for a short period before being overwhelmed and permanently crashing.

Microbots

While a robot like a crop spider is very small, microbots go a step further. Most are insect-sized and often designed to look like insects. Some even pass a close inspection and others are insects with microscopic cybernetic implants. The net result is the same.

The Roach

At three to four centimetres long, the roach is like a mid-sized beetle in size. It cannot fly but scuttles around on floors, walls and ceilings. The use of gekkocott feet grant the ability to stick to any surface, save certain types of PTFE plastics. The multi-faceted eyes of the roach require a computer to assemble into coherent images but the end result is sharp. It is also used as an audio monitor, with much of its ‘abdomen’ taken up by a high-gain microphone.

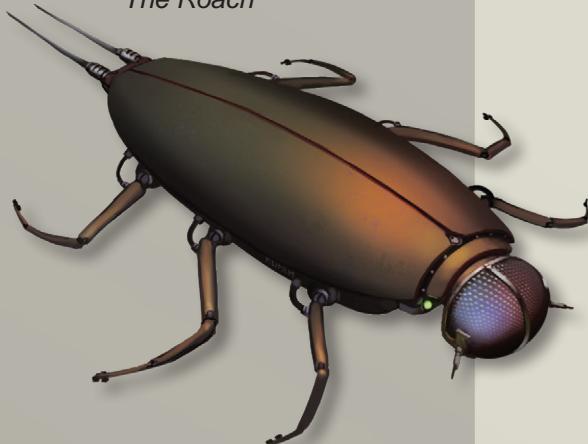
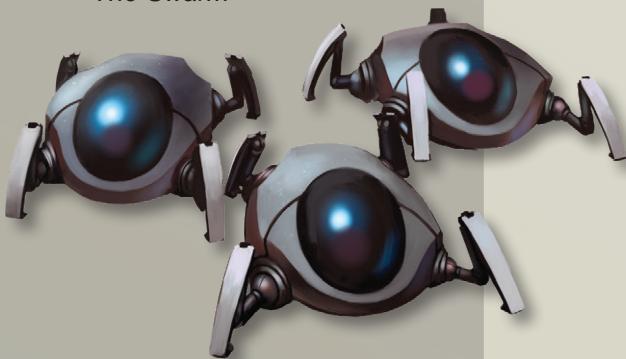
Robot	Hits	Speed	Cost
Roach	1	5 m	Lv10000
TL	12		
Locomotion	Walker		
Skills	Athletics (dexterity) 1, Athletics (endurance) 0, Recon 2, Stealth 2		
Attacks	—		
Manipulators	—		
Endurance	58 hours		
Traits	ATV, Small (-4)		
Programming	Basic (recon) (INT 4)		
Options	Audible Sensor, Camouflage: Audible (improved), Drone Interface, Encryption Module, Gecko Grippers, Transceiver 5 km (improved), Visual Spectrum Sensor, Wireless Data Link		

The Swarm

A swarm is composed of dozens of tiny machines, each an element in a distributed visual array. Each machine is about half the size of an average bluebottle housefly. These elements send their image segment and its precise location to the receiver, which then assembles an image or video from the aggregate.

A new swarm consists of 36 elements. Each time the swarm is used, 1D-1 elements are lost. When the swarm is at or below 18 elements, Recon checks suffer DM-2. When the swarm is at nine elements or below, it ceases to return a meaningful image. The listed cost is for a whole swarm.

Robot	Hits	Speed	Cost
Swarm	1	3 m	Lv10500
TL	12		
Locomotion	VTOL		
Skills	Athletics (dexterity) 1, Recon 2, Stealth 2		
Attacks	—		
Manipulators	—		
Endurance	1.9 hours		
Traits	Flyer, Small (-5)		
Programming	Basic (recon) (INT 4)		
Options	Camouflage: Audible (improved), Drone Interface, Encryption Module, Transceiver 500 m, Visual Spectrum Sensor, Wireless Data Link		

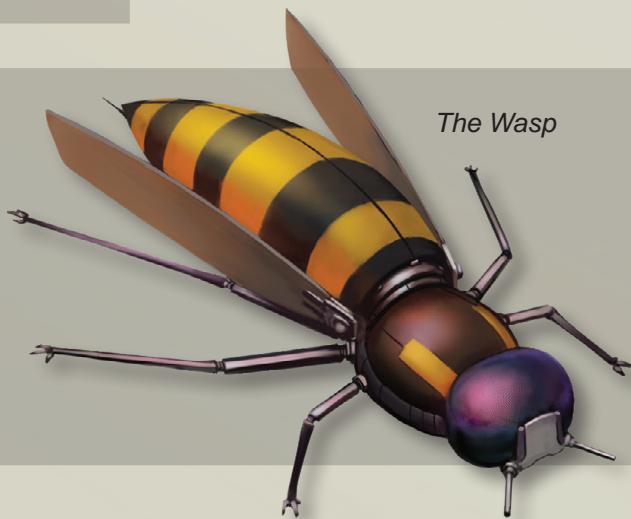
The Roach*The Swarm*

The Wasp

The wasp is smaller than the roach but is capable of flight as well as very limited surface movement. Like the roach, its compound eyes require computer augmentation to assemble the images but it does not have effective auditory capabilities; the sound and vibration from the wings would overwhelm any microphone. The remaining space is taken up by an injector needle, allowing the wasp to 'sting' anyone who grabs it to take a closer look. It can also be used to harass a target.

Microbot Wasp Venom (1D-1 1D minutes Average (8+) Endurance). Note that more severe poisons may be used instead.

Robot	Hits	Speed	Cost
Wasp	1	5 m	Lv10600
TL	12		
Locomotion	VTOL		
Skills	Athletics (dexterity) 1, Athletics (endurance) 0, Recon 2, Stealth 2		
Attacks	Injector Needle (Average (8+) END/1D-1/1D minutes)		
Manipulators	—		
Endurance	19 hours		
Traits	Flyer (idle), Small (-4)		
Programming	Basic (recon) (INT 4)		
Options	Camouflage: Audible (improved), Drone Interface, Encryption Module, Gecko Grippers, Injector Needle, Transceiver 5 km (improved), Visual Spectrum Sensor, Wireless Data Link		

The Wasp

Dolls and Shells

While the basic dolls and shells (see page 93–94 of *2300AD Characters and Equipment*) are relatively commonplace, there are a few different types available. Stock dolls and shells are designed for interpersonal interaction, often very ‘interpersonal’. However, there are other reasons why a Traveller may need a doll or shell, some of which may be illegal.

Aquitaine ‘Rover’ Enhanced Tourist Shell

The Rover was created by Aquitaine to enable Travellers who were unable to visit a world’s surface to still be able to experience exploring the world ‘in-person’ thanks to the 4G sensor suite in the shell. The Rover is more robust than a standard shell and equipped with enhanced capabilities to improve the experience for its users.

Although the Rover was intended to enable people with medical or environmental adaptation issues, in 2295 Janelle van Huys purchased 50 Rovers and founded ‘van Huys Interstellar Tours’. Participants in her tours can experience the thrill of visiting a new planet, without the risk of PAS or being eaten. While tourists have been ecstatic about the experience, the inhabitants of the worlds they visit are substantially less impressed. These so-called ‘tourbots’ spend little to no money and their impact tends to be largely negative.

Robot	Hits	Speed	Cost
Rover	22	6 m	Lv240000
TL	14		
Locomotion	Walker		
Skills	—		
Attacks	—		
Manipulators	2 x (STR 9 DEX 8)		
Endurance	72 hours		
Traits	Armour (+4), Heightened Senses,		
Programming	None or Drone (INT 0)		
Options	Audible Sensor, Avatar Receiver, 4G Sensor Suite, Drone Interface, Navigation System (improved), Olfactory Sensor (improved), Self-Repairing Chassis, Skinjob (advanced), Transceiver 500 km (enhanced), Visual Spectrum Sensor, Voder Speaker (broad spectrum), Wireless Data Link		

Modified Humanitech ‘Eve 6’ Doll, ‘Lilith’

Various types of dolls are common across the Frontier, especially at spaceports and tradestops. Almost perfectly human in appearance, the effect is only marred by a barcode etched into the synthetic skin over their left eye. Their ubiquity across the Frontier gives them a sort of ‘invisibility’, where they slip beneath notice. The stock ‘Eve 6’ is a standard doll designed for companionship and hospitality. ‘Lilith’ is based on the same chassis and is externally identical. However, Lilith is faster, stronger and programmed to seek and kill selected targets. It does so in as smart a fashion as possible, doing its utmost to not get found out.

Interestingly, there are rumours floating out of the world of the Black Clinics that a Lilith recently went rogue and killed its owners before disappearing. Most underground hackers suspect that someone got to the Lilith and compromised it.

Robot	Hits	Speed	Cost
Lilith	20	6 m	Lv920000
TL	14		
Locomotion	Walker		
Skills	Athletics (dexterity) 1, Athletics (strength) 1, Carouse 2, Deception 4, Melee (blade) 2, Melee 0, Profession (domestic servant) 2, Science (psychology) 2, Stealth 2, Steward 3		
Attacks	Punch (1D)		
Manipulators	2 x (STR 9 DEX 8)		
Endurance	72 hours		
Traits	Armour (+8), Heightened Senses		
Programming	Very Advanced (INT 12)		
Options	Audible Sensor (broad spectrum), Drone Interface, Olfactory Sensor (advanced), Skinjob (advanced), Transceiver 50 km (advanced), Visual Spectrum Sensor, Voder Speaker (broad spectrum), Weapon Mount (small), Wireless Data Link		

VEHICLE AND ROBOT DESIGN CHANGES

2300AD introduces a few additions to the robot design process, for use with the *Robot Handbook*.

Airship Lift

Long duration robots and drones sometimes make use of lighter-than-air (LTA) lift technology. The large surface area of the lift envelope is often covered with solar panels, giving the robot or drone almost unlimited endurance.

The size required is the same as the size of the robot or drone chassis. See table below

Subordinate Robot Carriers

Instead of being protected in a silo, a robot or drone can also carry subordinate units in external mounts on the chassis. They use as many Slots as their Size.

Mini-Lab

Scientific robots will often carry around a lab, miniaturised and optimised for a particular subject. When installed, choose a Science specialty from the list on page 100 of the *Traveller Core Rulebook*. A mini-lab costs Lv50000 and consumes four Slots.

Remote Control Tether

This tether still requires the on-board drone controller but allows more precise control than more interference-prone radio links. Using a tether grants DM+1 to all checks made with the tethered drone. Tethers typically unwind from the controlling vehicle or station, so do not require space on-board the drone. In some cases, however, they can be placed on the drone.

Cable Type	Cable Length	Spaces	Price
Metallic	500 m	0.5	Lv200
Metallic	5,000 m	1	Lv900
Fibre Optic	5,000 m	0.5	Lv2000
Fibre Optic	20,000 m	1.5	Lv18000

Name	TL	Slots	Speed	Volume	Cost	To be Hit
Lift Envelope, Size 1	7	+2	25 kph	2 m ³	Lv750	+0
Lift Envelope, Size 2	7	+4	50 kph	6 m ³	Lv1500	+1
Lift Envelope, Size 3	7	+6	125 kph	16 m ³	Lv2250	+1
Lift Envelope, Size 4	7	+8	150 kph	50 m ³	Lv4000	+2
Lift Envelope, Size 5	7	+10	175 kph	100 m ³	Lv15000	+3

CONSUMER PRODUCTS AND SERVICES

Even as colonists, the citizens of the Frontier are members of a high-technology interstellar society. In addition to what they grow or raise themselves, or the fruits of their toils in mines and refineries, colonists are also consumers. A wide range of goods and services are available on most colony worlds, catering to both the locals and to any off-world visitors.

The current model of colonial trade depends to a degree on colonists purchasing the output of Core corporations and government. The Core purchases raw materials from the Frontier, turns these materials into finished goods and sells some portion of this output back to the colonies. Intercolonial trade has long been discouraged by Core authorities, even between different colonies

on the same world. As the colonies get older and more mature, local industries develop, first to serve the needs of the colony, and then for trade to others. This is disruptive to the current model and is only possible due to the Libertine traders, who will carry goods between worlds and even Arms if there is profit for them.

While industrial goods are critical to the success of the colony, the success of the colonists, in their quest for a better life, relies in no small part on the availability of consumer goods. More than luxuries, access to these goods helps colonists be more comfortable and efficient, which ultimately impacts their productivity. In many cases, the provision of these goods can mean the difference between merely existing and living.

CONSUMER GOODS

A large number of consumer goods are available for purchase across the Frontier. Most small appliances and consumer goods are readily available, either locally-made or imported. These improve the quality of life for colonists and their families, not to mention Travellers far from home.

Appliances and Household Goods

Many different small appliances proliferate in the homes and kitchens of the Frontier. These include basics like microwave ovens, mixers, toasters and griddles. Given the worker shortage on most colonies, kitchen appliances that assist with quick meal preparation are popular and commonplace.

Item	TL	Kg	Cost
Small Appliance (various)	11	0.5–2	Lv10–200

Zapamoga Autokitchen

The autokitchen is a self-contained kitchen in a box, with small refrigerator, food printer, freezer, electric range and combination microwave/convection oven. It contains a sink but requires an external water supply and drain. Raw ingredients are stored in various storage areas and then combined by the autokitchen to make complete meals. The autokitchen is a large ceramic and synthetic box about 2 x 2 x 1 metres and contains enough material to make 50 complete meals. They are common with survey teams and pathfinders but too expensive for general use. While the autokitchen does include a food printer, it is capable of making more traditional meals from supplied ingredients.

Item	TL	Kg	Cost
Autokitchen	11	400	Lv8000

Zapamoga Extreme Coffee Maker

Given the importance some Travellers attach to their morning cup of coffee, a coffee maker capable of brewing a good cup in all conditions is invaluable. The Zapamoga Extreme is a sealed and pressurised unit and includes a small centrifuge to help coffee settle and steep properly in low- or zero-gravity.

Guaranteed Results. Every time. Zapamoga Five-Star Quality and Freshness.

Item	TL	Kg	Cost
Extreme Coffee Maker	11	8	Lv500

AmeriCo Top Chef Food Printer

Food printers are based on extrusion-type 3D printers. They are equipped with a number of hoppers for colour, flavour and texture, allowing almost any food type to be created. An internal oven and microwave can heat, brown or crisp final products as required.

Food printers are uncommon in private hands, although not unknown. They are very common in institutional settings, like offices, schools and accommodations like motels, motels and hostels. The very common Food Extruders™ vending machine is a larger, faster version of this same technology.

Item	TL	Kg	Cost
Top Chef Food Printer	11	25	Lv800

AmeriCo PocketChef Food Printer

The PocketChef is not exactly pocket size but it is small and compact. Similar to the Top Chef, it mixes ingredients to create a range of tastes and textures. It does not include a way to cook the results, however.

Item	TL	Kg	Cost
PocketChef Food Printer	11	1.5	Lv100

SofStuf

SofStuf was originally the brand name for a particular brand of foam tissue but the product became so popular that, as often happens, the brand name



Zapamoga
Autokitchen



Clothing
automat

became the common term. SofStuf is a soft, absorbent substance that foams up and cures to a fluffy consistency upon contact with atmospheric nitrogen. It is widely used as a facial tissue; as the exposed foamy part is torn from the top of the box in which it is packaged, the substance below becomes exposed to atmosphere and foams up to replace it. It takes less than two seconds to cure. SofStuf is also used as bandages, rags, washcloths and towels. It comes in a variety of colours.

Item	TL	Kg	Cost
SofStuf	9	0.25	Lv1

Composting Toilet

The composting toilet is an inexpensive method to reclaim household waste as fertiliser and soil conditioner. These are very common on worlds where the local biosphere is incompatible with human crops. The toilet is small and while it has no odour, it is typically kept in outhouse-type buildings.

Item	TL	Kg	Cost
Composting Toilet	9	50	Lv150

Clothing

Clothing can be made from an astonishing variety of materials, from animal skins to natural plant fibres to spun glass and metals. The clothes outlined here are

made from appropriate materials for their type and Tech Level. Superior materials can be used, which will increase the price by 100–400%. In a similar fashion, inferior materials can be used, which will typically reduce costs by 50% but runs the risk of ripping or disintegrating at inopportune moments. A common source of material for cheap and utilitarian clothing is the parachute material used in drop pods. Use of this material can reduce clothing costs by 50%, as the material is essentially free.

Most clothing is made from standard patterns to fit standard sizes. Tailored clothing is available on any developed colony for double the normal price.

Clothing Automat

In TL11+ colonies, bespoke clothing can be made in what amounts to a clothing vending machine. The customer steps into the machine and undergoes a full-body scan. The scan is then used to automatically create clothing drawn from a selection in the system, which then makes the clothing on the spot. The whole process takes a few minutes.

A particularly well-equipped colony might have several automat to supply the clothing needs of the colonists. Prices for automat-produced clothing are typically 20-50% higher than listed clothing prices.

Item	TL	Kg	Cost
Clothing Automat	11	2,000	Lv200000

Cheap Clothing

Cheap clothing is low-quality, inexpensive and casual for anyone on a budget. Cheap flashy clothing designed for partying can also be found in this category. This sort of clothing is rare on the Frontier and would only be found in larger cities.

Fashionable Clothing

Fashionable clothing, sometimes called clubwear, is flashy and often incorporates add-ons like flex-screens, light panels, colour changing and a limited ability to stretch or shrink using memory plastics and other smart materials. Like cheap clothing, it is rare on the Frontier, and would be seen as a frivolous luxury by most, to be found in the larger cities on the oldest colonies.

Formal Clothing

Formal clothing is of superior cut and quality to plain clothing. This is usually a suit including jacket, although a tie is uncommon. Kilts and sarongs are also common. Both genders typically accessorise with jewellery and quality footwear.

Clothing Type	Protection	Kg	Cost per Piece
Cheap	—	1–2	Lv10–20
Utilitarian	+1	1–2	Lv30–50
Plain	—	1–2	Lv50–100
Fashionable	—	1–2	SOC x Lv50
Formal	—	1–2	2 x SOC x Lv50

Mass and price are per piece, with undergarments having effectively no mass. A piece would be one of shoes, trousers, undergarments, shirt or light sweater. Outwear, including heavy sweaters and jackets, are double the mass and price

Clothing Add-ons	TL	Price
Light Panels	10	Lv50
Flex Screens	11	Lv100
Colour Changing	11	Lv50
Morphing	12	Lv100

Plain Clothing

Plain clothing is office wear, with decent cut and style but not expensive or flashy. On the Frontier, such clothing may be found in the offices of governments, corporations and Foundations. It would be rare otherwise.

Utilitarian Clothing

Utilitarian clothing is well-made, robust clothing made for function not style. This includes work and athletic clothing, as well as practical uniforms. Most clothing found on the Frontier falls into this category.

Uniforms

Uniforms are a type of utilitarian clothing designed to identify the wearer as part of a group and provide uniform appearance within an organisation. Military uniforms often have limited protection and even some camouflage capabilities

Clothing Type	Protection	TL	Kg	Cost
Uniform	+0	8	2	Lv30–50
Military Uniform, Field	+2	9	3	Lv100
Military Uniform, Standard	+1	8	3	Lv80

Overcoat

This is a long overcoat, available as either raincoat or cold weather gear.

Clothing Type	TL	Kg	Cost
Overcoat	8	2–4	Lv100–300
Winter Overcoat	8	2–5	Lv200–400

Waterproof Gear

This is not only used for inclement weather but is also common on surface ships in heavy seas. Waterproof gear consists of a high-collared jacket, pants hat and boots. Additional thermal protection is available that adds +15°C to the effective temperature. Gekkocott fasteners are used to attach the waterproof shell to the liner.

Clothing Type	Protection	TL	Kg	Cost
Waterproof Gear	+0	8	5	Lv500
Thermal Lining	+1	8	2	Lv100

Armoured Trenchcoat

The armoured trenchcoat protects the wearer with a flexible layer of ballistic gel under a layer of inertial cloth. The ballistic gel also provides a small amount of radiation protection.

Armour Type	Protection	TL	Rad	Kg	Cost
Armoured Trench Coat	+8	10	25	5	Lv3000

Hide Duster

This is a common article of clothing on many colony worlds but would be regarded as an atavism in the Core should such an item ever make it past OQC quarantine. The duster is a long, heavy leather coat, very durable and treated to be water-repellent. They are made from a variety of materials, including Terran cattle, oxen, Beta Canum buffalope, Chengdu omniphant and Beowulf cave dragon.

Clothing Type	Protection	TL	Kg	Cost
Hide Duster	+3	10	3	Lv2500

Boots

Lightweight fashion or hiking boots, with little or no protective capability.

Item	TL	Kg	Cost
Boots	10	1	Lv40-200

Headgear

Protecting the head and neck from stars, weather and insects, hats are ubiquitous across the Frontier.

CAP: A billed cap to provide protection from the sun. Often includes a neck drape to protect the neck from exposure or insects. Found in a variety of shapes and sizes, from berets to baseball caps to the kepi blanc of the Legion Etrangre.

Item	TL	Kg	Cost
Cap	10	—	Lv5-50
Neck Drape	10	—	+Lv5

HAT: A hat has a full brim to provide greater protection from the sun and other elements. It can be used with a neck drape or even full insect netting. On Cold Mountain rigid hats are used with fine chainmail screens for protection against razorflies; normal insect netting does

not suffice. These hats are provided for free to new colonists. Other examples include the classic fedora and cowboy hat.

Item	TL	Kg	Cost
Hat	10	—	Lv50-150
Cold Mountain Hat	10	0.5	Lv250

Eyewear

Even with easy cybernetic replacement of eyes, it is still critical to protect them when working.

SUNGLASSES: Sunglasses are typically made with tinted, polarised plastic lenses and available in a wide variety of fashions and shapes. The most common types found on the Frontier are either wraparound styles that almost completely enclose the eyes or else classic aviators. More expensive sunglasses include an electronic auto-darkening flare protection system and may also incorporate a wireless HUD, connected to a biomonitor, portacomp or nanocomp.

Item	TL	Kg	Cost
Sunglasses	10	—	Lv20
High Fashion	10	—	Lv80
Auto-darkening	10	—	+Lv50
HUD	10	—	+Lv100

SHOOTING GLASSES: These polycarbonate glasses are impact- and shock-resistant, designed to protect eyes from gunpowder particles, fragments and debris. They are typically not tinted but have the same options as sunglasses.

Item	TL	Kg	Cost
Shooting Glasses	10	—	Lv200

Gloves

Gloves protect the hands and ensure a tight grip on tools, weapons and vehicle controls.

LIGHT GLOVES: These would be driving or light duty gardening gloves. They have little protective value.

Item	TL	Kg	Cost
Light Gloves	10	—	Lv5-15

HEAVY GLOVES: Heavy work gloves or gauntlets, these have substantial protective ability against casual cuts or abrasions, and are suitable for most work-related duties.

Item	TL	Kg	Cost
Heavy Work Gloves	10	—	Lv10-50

TACTICAL GLOVES: These are reinforced across the knuckles and back of the hand. They have a wicking action to keep the hands dry and the trigger finger of either hand can be quickly removed. These reinforced gloves add +1 to the damage of unarmed strikes.

Item	TL	Kg	Cost
Tactical Gloves	10	—	Lv50-150

Environmental Protection

Some environments require active measures, including powered heating or cooling units.

COLD CLIMATE CLOTHING (HEATSUIT): Cold climate clothing consists of a lightweight, adjustable body suit with hood, goggles and lower face cover. The suit contains a battery pack and internal heating elements with the ability to maintain a stable climate down to external temperatures of -50° C. Battery life is about eight hours under the coldest conditions but closer to 36 hours under more typical cool weather conditions.

Item	TL	Kg	Cost
Cold Climate Clothing	10	2	Lv300

HOT CLIMATE CLOTHING (COOL SUIT): This incorporates a liquid-cooling system that covers the torso and head but leaves face and arms exposed. Use of the cool suit lowers the effective outside temperature by 15°. The cool suit uses a small belt unit to provide the cooling, with a battery good for 8–10 hours of operation. It is usually combined with light, loose desert clothing, which provides another 5° of cooling.

Item	TL	Kg	Cost
Cool Suit, Partial	10	2	Lv200
Desert Clothing	—	2	Lv50

RAINGEAR: While coats and jackets are often waterproof, they are only intended for casual forays into inclement weather. Rain gear is designed for extended wear and protection from the elements. It is available in pieces or as a complete suit.

Item	TL	Kg	Cost
Rain Jacket	8	1	Lv35
Rain Hat	8	0.5	Lv20
Rain Suit	8	3	Lv120

Jewellery and Personal Items

Life is not just about respirators and assault rifles. Personal items provide decoration, utility and personal care.

Pretty much any sort of jewellery and personal accessory is available across most of the Frontier. Luxury goods are always worth shipping. Typically, any single piece of jewellery runs from SOC x Lv5 to SOC x Lv50 but the sky is really the limit.

These items include earrings, nose rings and other body piercings, rings, bracelets, necklaces and similar objects.

Item	TL	Kg	Cost
Wedding Band	—	—	Lv400–4000
Locket and Chain	—	—	Lv80
Earrings	—	—	Lv10+

Chrono

Although the wearing of a classic wrist chronometer (a watch) is out of style with the advent of Link phones and body comps, it is still in favour with some, especially out on the Frontier.

Wrist chronos come in a wide variety of shapes and styles, both electronic and mechanical. With the use of SCEMR sensors, completely mechanical chronos are in fashion with some groups, such as special forces, militias and police. The mechanical chrono is an expensive piece of precision machinery; auto-winding, with day, date, hours, minutes and seconds, along with chronograph hours, minutes and seconds. It has a spring power reserve of 56 hours. Outside of the military and some scientific circles, wearing a chrono is a definite status symbol.

Item	TL	Kg	Cost
Wrist Chrono	10	—	Lv400+

Leather Wrist Bracer

Both a fashion statement and ostensibly protective gear, a leather wrist bracer is made of leather or a vat-grown substitute and typically goes from wrist to the middle of the forearm.

Item	TL	Kg	Cost
Wrist Bracer	3	—	Lv10

Personal Make-up

As opposed to a stage make-up kit, personal makeup is a selection of appearance-enhancing cosmetics. Used by all genders, make-up kits are a common commodity across the Frontier. Like many luxury items, cost varies with quality but the numbers here are for an average set.

Item	TL	Kg	Cost
Personal Make-up	10	1	Lv50

Professional Make-up Kit

The term make-up kit can actually be applied to two very similar items with different purposes. Most make-up kits are used by people in the public eye (actors and the like) to augment their appearance, but they are also useful in undercover or criminal endeavours as well, to create disguises.

These kits typically include (but are not limited to) hair colouring dye, modelling putty for altering facial features, coloured contact lenses, false eyelashes and artificial facial hair, necessary adhesives and solvents, coloured facial powder and pencils for toning and highlighting, setting powder, necessary applicators and brushes, and a variety of basic skin tone foundation.

Use of the make-up kit to create an effective disguise requires either the Deception or Art (performer) skill. It provides DM+2 to relevant Art (performer), Deception or Persuade checks. Computer-controlled security systems suffer DM-1 to checks when attempting to penetrate a disguise.

Item	TL	Kg	Cost
Professional Make-up Kit	11	5	Lv900

Personal Hygiene Kit

On the Frontier, people are often on the move, away from permanent housing and transient. The personal hygiene kit is designed to provide everything needed to keep a person clean and presentable, even at the end of a hard working day.

The kit includes depilatory of choice, often a razor but sometimes a crème, dental hygiene including a sonic toothbrush and floss picks, skin care material, NanoWipes™ and the famous Shower-in-a-Can™. NanoWipes are conveniently-packaged in 100-count dispensers and one is sufficient to thoroughly wash face and hands. If more thorough cleaning is needed, and conventional shower facilities are not available or inadequate, then Shower-in-a-Can™ is a Traveller's best friend. Simply spray Shower-in-a-Can™ over the entire body, including hair, and then wipe it off. Shower-in-a-Can™ is available in a variety of fresh scents.

Item	TL	Kg	Cost
Personal Hygiene Kit	10	2	Lv100
Shower-in-a-Can™ (5 uses)	10	0.5	Lv10
NanoWipes (100 pack)	10	0.1	Lv10

Feminine Hygiene Kit

Most colonial governments provide feminine hygiene products to their citizens as part of health care. While easy access to hormone blockers and birth control can eliminate the need for menstrual care products, there are circumstances when that is not available. In circumstances where government or corporate health care does not cover the provision of feminine hygiene products, these self-contained kits are available from vending machines and most stores.

Each kit contains enough material to manage for one month.

Item	TL	Kg	Cost
Feminine Hygiene Kit	10	3	Lv50



'Leonardo' Auto-Tattoo Artist

momotaro Lynx Audio system



Skinwatch

The skinwatch is a display tattooed on the skin, using a variation of electronic ink to create the display. A controller the size of a grain of rice is embedded in the skin under the watch. Both controller and skinwatch are powered by body heat. In case of death of the user, the data on the controller can identify time of death.

Item	TL	Kg	Cost
Skinwatch	11	—	Lv100

Tattoos

Tattoos are a common way of decorating the body. The cost of any tattoo depends on complexity and the time it takes to ink it on. While machine tattoos are cheaper than one from a human artist, they suffer from a lack of individual creativity. Perfect, but somehow less than the work of a skilled artist.

In Spacer communities, body art is almost always the province of specialised artists, often found at Libertine gatherings. Baxtalo station in the Chengdu system is the home of the famous tattoo artist Lora Pecchia, who designs and applies body art for the heads of ships and families. She will not work for non-Spacers, for any price.

A machine tattoo costs Lv50/hour, while an artist will charge Lv100 or more per hour. A simple tattoo might take 15 minutes while a very complex one,

like a full sleeve, could take several hours and require successive applications. A tattoo machine is required to apply skinwatches, light panels and display panels. These latter typically require a PAN (Personal Area Network) and a body comp or nanocomp to control.

Light Panel

Luminescent panels use inks based off luciferin, one of the chemicals used in the production of bioluminescent light in insects such as the firefly. Modified variants of this chemical produce different colours. Light panels do not illuminate much beyond a metre but can be seen from much further away. They are primarily decorative.

Item	TL	Kg	Cost
Light Panel	11	—	Lv80

Display Panel

This more advanced version of the light panel uses a tattoo machine to create clusters of multicoloured dots like an older display panel. This gives the panel broadcast (8K) resolution, practically anywhere on the body. The addition of a touch receptor inked on with the display allows it to be used as the input/output device for a connected data system, from Link phones to terminals.

Item	TL	Kg	Cost
Display Panel	11	—	Lv200
Touch Receptors	11	—	Lv200

Bayerische Bioteknik 'Leonardo' Auto-Tattoo Artist

The Leonardo Auto-Tattoo Artist is one of the most popular tattoo machines produced. It can be found in countless starport bars and hotels, and its distinctive results are common among commercial starship crews and groundside personnel alike. Spacers only use these machines for special purpose tattoos like skinwatches and displays, preferring the human touch for decorative work.

Item	TL	Kg	Cost
Leonardo Auto-Tattoo	11	90	Lv10000

Personal Electronics

Beyond computer systems, there are countless electronic devices to improve the lives of colonists and Travellers.

Momotaro Lynx Audio System

While a Link phone or comp can store a great deal of media, and the Link used to access more, actual playback fidelity depends on the quality of the

Best Friend™

Designed to look like a variety of different plush animals, both from the Core and the Frontier, the Best Friend™ is a toy aimed at younger children. It contains a nanocomp with a Link connection and has a soft touch screen display in its chest, although it also responds to voice commands from authorised users. A series of myomer actuators give the face realistic expressions and the mouth moves in sync as it talks. Limbs can also move to form a limited number of gestures, like a hug, but it cannot actually walk. Not only is the Best Friend™ a toy, it also allows parents and authorities to monitor the child's movements and interactions with others. Children get very attached to their Best Friend™, a testament to the social engineering that goes into them.

Item	Processing	TL	Kg	Cost
Best Friend™	1	11	1	Lv200

audio system. This audio system can pair wirelessly with any Link phone or comp within 20 metres, so long as the correct access code is provided on both devices. It can then be used to play any audio file in full 3D surround sound. It does not require an array of speakers to do this, simply several directional audio projectors that bounce sound around a room.

The audio system is built around a nanocomp and includes a port to insert memory chips with sound files.

Item	TL	Kg	Cost
Audio System	10	1	Lv20

Gaming Console

While portacoms and even nanocomps can be used to play games on large display devices, there exist dedicated gaming systems that really do little except play games and audio-visual or holographic media. Aficionados of these dedicated systems say the experience is superior to gaming off a comp. Most game consoles can run VR out of the box and extended VR is available with accessories. An add-on processor makes the systems capable of full immersive play but experts caution that people should not play immersives for more than two hours at a time.

There are several makes of console, running proprietary, and exclusive, operating systems. Games are not compatible across systems, although the consoles are capable of running games up to Bandwidth/3 designed for a comp (with an emulator). A console can run Bandwidth/4 games designed specifically for it.

Brands like the Momotaro PlayZone and Aquitaine ExoGear dominate the market for first-party games, especially in the Core and on more-developed colony worlds. However, there are several smaller manufacturers on worlds across the Frontier who make and sell consoles and games based on older gaming systems that are obsolescent in the Core but still perfectly playable. It is not worth the time and effort for Momotaro to track all these little operators down, unless they try to export games and systems across multiple worlds.

The Processing score of a game console is only for games and emulation software. For everything else, Processing is decreased by -2.

Item	Processing	TL	Kg	Cost
Gaming Console	4	11	—	Lv200

Toys

Even with a wealth of electronics available, children still want to play with toys. While many toys only exist in virtual space, a good deal more are real, physical objects. Dolls, stuffed animals, gekkocott building sets, and play tools and weapons are still an important part of childhood. Like many goods that find their way to the colonies, these items are typically manufactured in orbital factories around Earth and Tirane, with a limited selection of the most expensive, heirloom-varietiy toys still made by hand by artisans in the Core.

Item	TL	Kg	Cost
Toys (general)	10	0.2–10	Lv10–200
Plush Pentapod Talking Toy	11	0.3	Lv30
Handmade Rag Doll	8	0.5	Lv400
Construction Toy (2,000 pcs)	9	1.0	Lv90

Momotaro EnVision VR Rig

For those who do not want to implant cybernetics or a neural jack, the next best thing is a VR rig. The rig consists of a wrap-around headset with an UltraDef screen, multi-speaker sound, glove controllers, a sub-woofer placed on the lower abdomen and a mesh body sleeve with positional and haptic sensor/effector systems. Other accessories are available to extend and improve the experience.

Item	Rating	TL	Kg	Cost
Momotaro EnVision VR Rig	5	11	2	Lv1200
Accessories	Lv200–1000			

Furniture

When people move out to the Frontier, a minimum of furniture is required. Folding furniture is more robust in the long term but takes up more space in shipping.

Folding Furniture

Using a combination of memory plastics and electrostatically-stabilised composite materials, folding furniture can compact to as little as 10% of the deployed size. While not as comfortable as conventional furniture, the portable nature and ability of memory plastics to conform to body shape over time compensates. Folding furniture is found in base camps, new outposts and temporary housing all over the Frontier.

Item	TL	Kg	Cost
Folding Chair	11	2	Lv100
Folding Table	11	3	Lv150
Folding Couch	11	4	Lv200
Folding Bed Frame	11	3	Lv250
Folding Desk	11	3	Lv170

Flat-pack Furniture

Standard furniture on the Frontier is shipped unassembled and flat. Once assembled, they do not come apart again without damaging the item. Mattresses and other soft components are shipped compressed in vacuum-sealed packaging. Fully-assembled furniture is too expensive for all but the richest to ship to a colony world.

Large quantities of this style of furniture are shipped to colony worlds for use by colonists. Many governments subsidise the shipping of flat pack furniture in order to provide for their needs.

Item	TL	Kg	Cost
Chair	10	7	Lv8
Table	10	12	Lv120
Couch	10	30	Lv150
Bed Frame	10	25	Lv200
Desk	10	10	Lv120
Mattress	10	10	Lv200

SERVICES AND ACCOMMODATION

Across the worlds of humanity, some things are constant but few are more important than the need for food and lodging. This section includes costs and availability of food and lodging across the Frontier. All services are available in the Core, although usually 1D x 5% less expensive.

Starports and the accompanying towns and cities are the centre of a Frontier world's contact with the outside universe. As such, they have the greatest number of services and the best availability of equipment.

Entertainment

There is an immense amount of entertainment media produced at the beginning of the 24th century. Electronic books, real paper books, movies, experientials, holo-programmes, music, and many other forms of entertainment. Most of these are aimed at the Core market, catering to the tastes of the 50% of the adult population that is un- or under-employed. Most forms of entertainment can be downloaded or streamed from any comp.

Experiential entertainment requires either a VR rig or a neural jack.

Item	TL	Kg	Cost
E-book	10	—	Lv5
Paper Book	10	0.5	Lv50
Experiential (30 minutes)	11	—	Lv20
Music (1 hour)	10	—	Lv3
Movie (2 hours)	10	—	Lv5
Live Music	—	—	Lv100 per show

Food

Pre-packaged meals are very common, even in the Core, and cooking is something of a lost art to most. An actual cooked meal is considered a luxury, as even most restaurants make do with pre-packaged food, albeit with better presentation.

A Traveller can expect to pay SOC x Lv5 per day for pre-pack food. These meals have roughly the same nutritional value at all price ranges but taste, texture

Food Extruders

Quite possibly the most popular, or at least most common, food vending machine in human space, a Food Extruder (Home of the Foot Long Egg™!) machine is a sophisticated food printer, able to overlay and intermix a wide variety of food flavours, textures and aromas, and then cook them to taste. It is all artificial but difficult to tell the difference between a Food Extruders' egg and one cooked at home. All Food Extruder products are certified VeganSA 8005.

THE FOOT LONG EGG™: Named with an archaic unit of measure, this 35 centimetre long roll has what appears to be breakfast sausage at the centre, surrounded by the eponymous egg, with a flakey, toasted outer biscuit layer. Available with a savoury white gravy for dipping.

Item	TL	Kg	Cost
The Foot Long Egg™	10	0.5	Lv5
White Gravy	10	0.1	Lv1

CHICKEN TIKKIMASALA ROLL: A creamy curry sauce and shredded chicken make up the centre of this 35 centimetre roll, surrounded by a container of naan bread that prevents the sauce from leaking.

Item	TL	Kg	Cost
Chicken Tikki Masala Roll	10	0.5	Lv5

SAUSAGE ROLL: A classic sausage roll with a buttery puff pastry exterior and a filling of egg, ground sausage, onions and spices. Sold in 12 centimetre lengths.

Item	TL	Kg	Cost
Sausage Roll	10	0.25	Lv2

Food Extruders (continued)

AMERICAN-STYLE™ BURGER ROLL: The Burger Roll, like the Foot Long Egg, is unique to Food Extruders. It consists of an inner layer of ground beef (or a reasonable facsimile thereof) mixed with a selection of condiments, then a layer of cheese, then a selection of trimmings like onions, lettuce, tomatoes or cucumber pickles, all encased in an outer layer of soft white bread, lightly toasted on the outside. Available in 35 and 70 centimetres lengths.

Item	TL	Kg	Cost
American-Style™ Burger Roll	10	0.6/1.2	Lv7 or Lv10

and presentation improve as one pays more. Most such meals are self-heating or self-chilling, as appropriate. The best of these meals have a Zapamoga Five-Star rating and a Traveller would typically pay Lv100 per day for pre-pack food of this quality.

Eating Out

With the decline in cooking skills, even on the Frontier, restaurant and food cart dining and take-away, along with meals dispensed from vending machines, have become very common. Many Drifters run food carts dispensing ethnic food or other long-time favourites for extra income.

'Fast-food' restaurants and vendors offer a wide range of meals and flavours, much of it synthetic. These businesses will charge between Lv5 and Lv15 per meal, although the nutritional quality may not be the best.

Fine dining is a rarity and Travellers should be prepared to spend Lv100 or more per person. Few colonies can boast more than a scant few of this class of business, although richer, older colonies like those on Beta Canum, Ellis or Chengdu, would have more.

Recreational Substances

Humanity has a long history of indulging in recreational substances, from alcohol and tobacco to psychedelics and hallucinogens. The legality of any substance varies according to the Law Level of a nation or colony. A few examples are noted below, along with the Law Level they are typically banned at.

STIM STICKS: A stim stick (also called a sin stick) is a cigarette guaranteed to not be addictive, carcinogenic or stain your teeth (individuals may have variations in experience). It contains a mild stimulant, about equal to a cup of coffee. Stim sticks are self-lighting; just scratch them against any available rough surface and they ignite.

Item	TL	Law Level	Kg	Cost
Stim Sticks	10	9	—	Lv15/pack

BEER: One of the most common recreational substances consumed in human space, beer is brewed everywhere hops can be encouraged to grow. While most colonists tend to prefer local brews out of pride, there are many widely exported varieties from across human space.

These are some example beers from across the Frontier. Some are identified as 'local', meaning they are only available on the planet where they are brewed, while others are labelled 'export' and are luxury items commanding a premium price.

Beer	World of Origin	Type	TL	Law Level	Kg	Cost
Lucky Lager	Chengdu	Local	8	9	1.2/pack of 6	Lv8/pack
Dragon's Brew	Beowulf	Export	10	9	0.3 per bottle	Lv5/bottle
Rock Bottom Ale	Crater	Local	8	9	1.3/pack of 6	Lv6/pack
Gleens IPA	Ellis	Export	11	9	0.3/per bottle	Lv5/bottle

Wine and Spirits	World of Origin	Type	TL	Law Level	Kg	Cost
Pinot Grigio d'Elysee	Joi	Export	8	8	1.5/bottle	Lv400/bottle
Baby Dragon	Beowulf	Local	10	8	1.1/bottle	Lv10/bottle
Canadian Club Whiskey	Chengdu	Export	8	8	0.8/bottle	Lv20/bottle
Wild Turkey Bourbon	Ellis	Local	10	8	1.5/per bottle	Lv15/bottle

WINE AND SPIRITS: Next to the many varieties of beer, wines and spirits are among the most popular recreational substances available.

OTHER DRUGS: With no international system of laws in place governing the cultivation and export of drugs and their derivatives, controlling their import is difficult and dangerous. Instead, most nations effectively legalise drug use save for the so-called ‘hard drugs’, largely cocaine and opium derivatives. All other drugs are, if not legal, then at least officially ignored until there is a problem.

MILD DRUGS

(Law Level 8)

Mild drugs are ones that have minimal effects, no more adverse than alcohol, and are not physically addictive. Examples include marijuana and certain hallucinogens. In actuality, few drugs are more harmful and dangerous than alcohol but it is nonetheless socially accepted.

These drugs generally cost no more than Lv5–Lv10 per dose, often less. They are easy to find if legal and only require a Routine (6+) Streetwise check (D3 hours, INT) to find if they are not.

MODERATE DRUGS

(Law Level 6)

Moderate drugs include more powerful hallucinogens and shadow-market stimulants, including amphetamine-analogues and synthetic adrenaline. These substances can be addictive and can hurt the user and, to a lesser extent, those around them.

Moderate drugs are typically controlled and finding them requires an Average (8+) Streetwise check (1D hours, INT). Cost per dose is around Lv5–Lv20.

DANGEROUS DRUGS

(Law Level 4)

These include opium derivatives, most cocaine derivatives, powerful hallucinogens and other substances that can cause substantial harm to both individual and society. These substances are usually highly-addictive and come with a host of side-effects.

Finding dangerous drugs requires a Very Difficult (12+) Streetwise check (1D days, INT). Failure often indicates an encounter with local law enforcement.

COFFEE

(Law Level 10)

Coffee is grown across human space, although aficionados maintain that the best coffee comes from Earth, although after that opinions are divided. It is generally available everywhere but the taste varies significantly from world-to-world. Local varieties are generally at least tolerated, if not preferred.

Coffee is purchased by the cup or carafe, usually Lv3 for a cup and Lv10 for a six-cup carafe.

TEA

(Law Level 10)

Like tea, coffee is grown across human space. However, connoisseurs generally agree that the best tea comes from Syuhlam and the Cantonese Lihngtou colony. Both their black and green varieties capture flavours that just cannot be found anywhere else. Purists still swear by Earth-based teas but they are in the minority.

Tea is likewise purchased by the cup or carafe, usually Lv3 for a cup and Lv10 for a six-cup carafe.

Soft Drinks

Soft drinks are widely consumed, both in themselves and as mixers for other drinks and cocktails. AmeriCo is by far the largest producer and bottler of soft drinks in human space, with dozens of types and flavours.

AMERICOLA: The most famous and widely-consumed of AmeriCo’s products, this product’s red, white and blue logo is familiar to everyone. Even AmeriCola is available in a variety of different flavours, including the popular Buzz!, with the slogan ‘All the Sweet and Twice the Buzz! BuzzCola!’.

Most varieties of AmeriCola cost Lv2 for a 500 millilitre bottle and Lv4 for a two litre bottle.

BOOSTER: Booster comes from Alsace Beverages, one of the few international competitors to AmeriCo. In contrast to the hype from AmeriCo, Booster is advertised as a natural blend of fruits and berries in a carbonated spring water base. It is available in a huge variety of flavours and Alsace also has vending machines that allow customers to create their own custom blends, in either a liquid or slush base.

A 750 millilitre bottle of Booster costs Lv6, while a drink from a vending machine varies between Lv4 and Lv8, depending on additions.

INDEX: Marketed as a drink that improves performance and concentration, InIndex is loaded with as much artificial caffeine-analogue and pure cane sugar as American laws will allow. It is a favourite with students and fringers.

InIndex is more expensive than AmeriCola varieties, at Lv5 for a 500 millilitre bottle.

Bottom of the Beanstalk

One of the most expensive, and exclusive, restaurants in human space, Chastain's (The Bottom of the Beanstalk) sits on the far end of the Beanstalk counterweight in orbit around Beta Canum. The transparent floor of the restaurant looks out and away from the counterweight and the world it orbits into deep space.

Just getting to the restaurant is an adventure. The exclusive Adrien's Express, a set of private Beanstalk capsules, run three times a day to and from the orbital terminal that sits in synchronous orbit above Premiere, the capital of the French colony. Just the trip to the counterweight from the terminal takes two days. Once the guests arrive at the nearside terminal on the counterweight, they debark and enter a capsule that passes straight through the counterweight asteroid to the restaurant on the other side.

There is no menu. Guests eat what they are served, with the guarantee that it will be superb. A recent meal at Chastain's was a nine-course meal and consisted of the following:

HORS D'OEUVRES: Choice of star oysters from Joi, served with three shots of ticala from Paulo or a Pissaladiere with anchovies from Earth, and a glass of Sauvage, a white wine from the French colony on Beowulf.

Soup: Beef consommé, dressed with Joian tree chicken egg yolks and a medley of sliced vegetables from the restaurant's own greenhouse.

APPETISER: Gougeres with bearnaise sauce or Escargots d'Europa Neuve, made with high-altitude tree snails from the French colony on Beowulf. Chilled Monkey's Paw sparkling white is served with both.

SALAD: Fresh garden salad with greens picked that day from the restaurant's greenhouse, served with balsamic vinegar and olive oil imported from Earth.

FISH: Lemon-garlic canumpia from Beta Canum (note that the canumpia, although savoury, will not digest completely due to incompatible biochemistry).

MAIN COURSE: Herb-crusted venison medallions from Nous Voila.

PALATE CLEANSER: Mint sorbet (fresh mint from the restaurant's greenhouse).

DESSERT: Lemon crème brûlée and a glass of Pinot Grigio d'Elysee, from one of the last shipments of white wine from the former French colony.

MIGNARDISE: Bite sized macarons with coffee from Montana.

The restaurant package, which includes return transport from the orbital terminal, runs between Lv30000 to Lv50000, depending on the season. There is currently a two-year wait.

Lodging

A coffin hotel at the starport on most worlds will cost Lv10 per night, as will a stay in a questionable hotel or motel. This is about as basic accommodation as anyone can get.

Higher quality lodging is available and, like food, is tied to SOC. In order to maintain SOC, a Traveller must spend SOC x Lv300 per month for temporary lodging like a hotel and SOC x Lv150 per month for something like a leased apartment. A detached house would be double that amount and the cost in the heart of a major city would be at least quadrupled.

Commercial Space

Sometimes Travellers have a plan (or scheme) that requires shop or office space. These spaces are generally available in small (5 x 10 metre), medium (10 x 10 metre), and large (20 x 10 metre) bay sizes in standard prefab buildings. A shop space, like a garage or space suitable for a machine shop, would be Lv500/month for a small space, Lv1000/month for a medium space and Lv2000/month for a large space. Office and retail space would be roughly 50% more expensive. None of these costs include equipment or tools.

These prices are for industrial parks and rural areas. The prices will ramp up as a location moves closer to the city centre, up to 10x more for a location in the core of a major city of a major colony, like Premiere on Beta Canum.

Coffin Hotel

A coffin hotel is a stack of modules, each about 1.2 x 1.5 x 2.2 metres. They are equipped with a decent mechanical lock (requiring a Difficult (10+) Mechanic check (1D minutes, INT) to pick), a fixed foam mattress and storage for a pack or suitcase. All surfaces are designed to be easily hosed off and disinfected. Each floor of a coffin hotel holds between 30 and 60 units, although some facilities, like the Beanstalk ground station of Beta Canum, have considerably more. Each floor contains washing, bathing and washroom facilities, some food and clothing vending machines and a small sit-down area that is almost never used. Each facility has a small number of rentable lockers for larger items.

TRANSPORTATION

If Travellers do not have a vehicle of their own for planetary travel, they will have to use other means to get around. The entries here reference local, regional and national travel distances; local travel is usually within one city and its extended metropolitan area, usually no more than 50–100 kilometres, while regional travel is within 500 kilometres and national is within 5,000 kilometres.

Transit

While the notion of Travellers riding a bus or subway may not seem heroic, it is a common way to get around. Few in the Core own private vehicles and public transit is just more convenient and less expensive.

Travel Cost: Lv1 for local transit.

Autocab

An autocab is a self-driving vehicle that can be hired through a Link device and usually arrives within 1D minutes. The autocab will take its passengers to any destination they designate within its range of service, usually no more than 100 kilometres. Autocab drivers are a common replacement for privately owned or even rented vehicles, especially in larger cities on the Frontier and in the Core.

Travel Cost: Lv5, plus Lv0.5 per kilometre.



Tube

The Tube is a high-speed transit system found only in the Core. Tube systems run passenger trains in evacuated tunnels deep underground, allowing them to hit speeds of up to 2,000 kilometres per hour.

Travel Cost: Lv5 for local transit, Lv20 for regional and Lv200 for national travel, when available.

Train

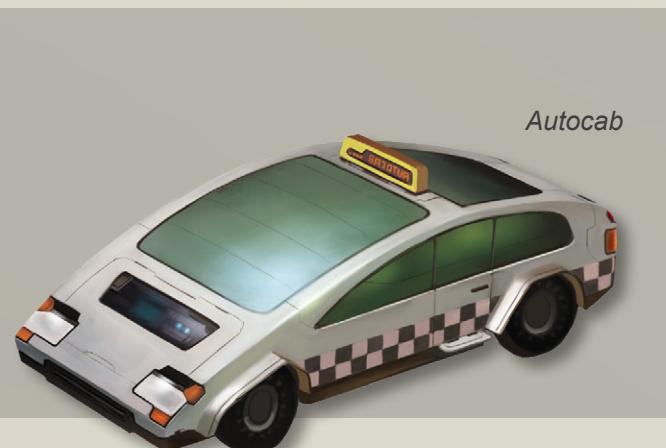
Passenger trains are rare in the Core but more common on the Frontier. These systems are generally easier to build and less expensive to operate than Tube systems, but much slower. Most surface trains run at 300–400 kilometres per hour.

Travel Cost: Lv1 for local transit, Lv10 for regional and Lv100 for national travel, when available.

Airship

Airships are common on Frontier worlds, especially those without a well-developed transportation infrastructure. Airships require little in the way of facilities, especially the small, Magnus-effect types. Airships are not often used in the Core outside of the French Empire, where they are used for direct high-volume cargo and freight between European France and Imperial member-states in Africa.

Travel Cost: Lv25 for a regional trip.



Airplane

Frontier air travel is usually by tilt-rotor or STOL aircraft and flying boats are common. Tilt-rotors are used for regional travel requirements but rarely for more local travel. While airship travel is often more common, aircraft are used when speed is required. In the Core tilt-rotor aircraft are very common, even serving local destinations as well as regional. National travel in the Core is usually by Tube and spaceplane when speed is necessary.

Travel Cost:

Lv0.1 per kilometre, with a minimum of Lv100.

Spaceplane (sub-orbital)

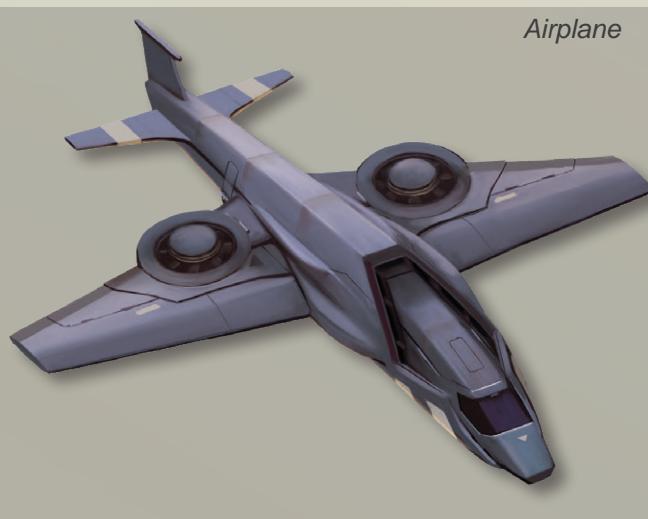
The fastest and most expensive way to get anywhere on a planet is by sub-orbital spaceplane. While uncommon on lesser-developed colony worlds, they can reach anywhere on a planet in a number of hours equal to the world's Size divided by three. On Earth (Size 8), it would take ($8/3 = 2\frac{2}{3} = 2$ hours 40 minutes) to get anywhere.

Travel Cost:

Lv2000 per flight, one-way.

Vehicle Renting

Tier	1	2	3	4	5	6
Standard	+4	+2	+0	-2	-4	-6
Non-Standard	+2	+0	-2	-4	-6	-8
Aircraft	+0	-2	-4	-6	-8	-10



Vehicle Rental

The cost of renting a vehicle is dependent on the vehicle's base new cost. All rental vehicles require a refundable deposit, usually equal to 5% of its cost.

For standard ground vehicles, rent is equal to 1% of the vehicle's cost, per day. For non-standard vehicles, including off-road vehicles, hovercraft and boats, this is 2% of the vehicle's cost, per day. Aircraft can be rented for 5% of their cost, per day, and require a deposit of 10%.

Availability of a rental vehicle depends on the Tier level of the colony or nation. Finding a vehicle for rent requires a Routine (6+) Broker or Streetwise check (INT), with a modifier from the Vehicle Renting table. In the Core, DM+2 is applied to this check.



COMPUTERS

Even out on the Frontier, computers of various kinds are found everywhere. From Links to nanocomps in clothing, to body comps and workstations in offices and labs, computers are as intertwined with colonial life as they are in the Core.

Generically known as comps, the various types of computers, from Link phones to workstations, run basically the same software, although they have a variety of operating systems tailored to their requirements.

Bodycomp

Bodycomps are similar in computing power to portacomps but designed to be worn across the body as a distributed unit, connected via a Personal Area Network. A typical bodycomp like the Aquitaine Hyper70 includes a main processor mounted on the arm, a HUD, a set of sensors on the hand for typing and gesture-based computing and additional accessories like sensors or communicators mounted where convenient. Most bodycomps can make use of wireless Link services. The various bodycomp components have their own power supplies and typically last 24–36 hours before needing to be replaced or recharged.

Like the portacomp, the bodycomp is a computer/4. They are capable of Link access but dependent on the availability of at least a low-speed network. If it is necessary to determine if a network is available, roll 2D with a DM of the colony's Telecommunication code. On an 8+, a data network is available.

Housecomp

Many houses are equipped with a housecomp, a network of nanocomps and a central control system equivalent in processing power to a portacomp. The housecomp responds to voice commands and can make use of display panels, personal portacomps and even Link phones to display visual information. Housecomps have complete control of the house's environment and are connected to lights, appliances, heating, ventilation and air conditioning (HVAC) systems. This latter category can include life support systems for homes on more hostile worlds.

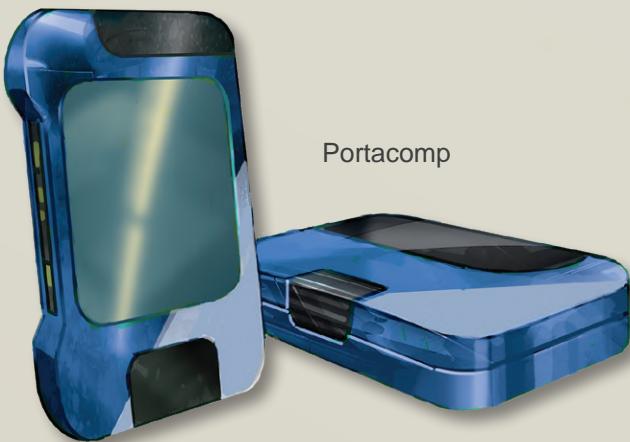
Housecomps are almost universally present in homes in the Core, at least in Tier 1–4 nations. They are rarer on the Frontier but are making inroads. They are actually more popular on more hostile worlds, as housecomps can monitor and control life support, air and water filtration systems.

Although the core of the system is based on a portacomp, the entire household network has lower computing power, due to the demands of the firewall, monitoring system and other household functions. The housecomp will be connected to the Link network whenever possible but does not require a Link to work effectively, unlike a Link phone.

Link Phone

A Link phone connects to the planetary networks and data services available on many colony worlds. Link phones sold on Core worlds include a panic button

Item	Processing	TL	Kg	Cost
Bodycomp	4	11	0.5	Lv600
Housecomp	3	10	10	Lv2000
Link Phone Voice/Data Access	1 —	10 —	0.2 —	Lv50 Lv5/month
Nanocomp	2	11	0.1	Lv100
Portacomp	4	11	0.5	Lv300
Portacomp, Ruggedised	4	11	1.5	Lv1100
Workstation	5	11	5	Lv2500
Workstation	6	12	5	Lv5000



Portacomp

feature, which will summon authorities to the location of the phone; this requires that the phone be tracked but most people value the added security. This feature is not available on the Frontier, where authorities do not generally track their citizens. Link phones also serve as small computers, game-playing devices, cameras, voice recorders and GPS systems. In the Core they are everywhere and on any colony world with a well-developed data/communications infrastructure. Battery life on a Link phone is normally around 72 hours standby or 24 hours of continuous use.

A Link phone has effectively unlimited storage for general data purposes and image capture and can act as a GPS on worlds with a navsat array. Link phones have a base range of only 10 kilometres and are dependent on the availability of at least a low-speed network. If necessary to determine if a network is available, roll 2D with a DM of the colony's Telecommunication code. On an 8+, a data network is available.

Nanocomp

The nanocomp is a very small computer often included as part of clothing or equipment, or used on its own as a novelty or low-cost computer. It can be found in a variety of forms, including rings, pendants and even as earrings, and can be connected to a single display, along with a keyboard and pointing device. It cannot be used with any kind of display tank, although it can drive a pico-projector. Like most comps, nanocomps have wireless Link access. A typical nanocomp can run for 50 hours before requiring a recharge.

The nanocomp has effectively unlimited storage. It can only connect to networks within urban areas on colonies with Telecommunications 6+ or a dedicated data channel connection to another computer system.

Portacomp

The portacomp is a small handheld computer, usually carried in a plastic case on the belt or on a shoulder strap. A wide variety of makes and models are available, ranging from slates and tablets to the classic Aquitaine E500. The E500's keyboard is a one-handed five-key hemisphere roughly 10 centimetres in diameter, designed to be held in one hand. The monitor is on the back of the hemisphere and touch-sensitive, allowing an expanded range of inputs while programs are running. Voice input and output are also used but the keyboard and monitor are useful for a variety of precision inputs and graphic outputs. External monitors and input devices are available and use wireless connection and internal batteries. The machine is designed to run off of up to five memory/program chips. Other styles include tablets with touch and stylus input. The portacomp can be connected to any of the accessories and display options in this chapter. All makes of portacomp come with wireless Link access for data, which is charged at the same rate as a Link phone (Lv5/month). The battery pack on the portacomp is good for 36 hours of operation.

The ruggedised portacomp is the more common type encountered on the Frontier, usually in tablet format. While slightly larger than the standard type, it is considerably more robust. The back of the unit is protected by moulded Kevlex, with Protection +4.

A portacomp is capable of Link access but dependent on the availability of at least a low-speed network. If it is necessary to determine if a network is available, roll 2D with a DM of the colony's Telecommunication code. On an 8+, a data network is available.

Workstation Comp

Devices like Link phones, portacomp and similar devices are primarily for the consumption of media and creative material. Workstations are used to create the content, whether that be games, high-quality animated 3D features or more work-driven items like databases and professional software.

These large, static computer stations can be found on board starships, in businesses, in hospitals and even some ground vehicles. Anywhere that complex or delicate machinery must be operated or bulk information processed, a workstation can be found. The units can easily interact with any others on the same network, allowing information to be freely accessed from one unit by any other, depending on local security settings.

Machines of this power are rare on most colonies, generally only used by central authorities to run administrative and survey/metabase applications.

Accessories

Various types of additional technology and expansions can be fitted to comps to extend their capabilities.

BODY MOTION SENSOR

The body motion sensor is attached below a display device and used with interactive and gesture-based systems to provide an interface without having to glue anything to fingernails. It is primarily intended for static operations but can be used on the move as well. When on the move, DM-1 is applied to checks using the interface that require precise control.

Item	TL	Kg	Cost
Body Motion Sensor	10	0.1	Lv20

DISPLAY TANK

The large holographic display, or tank as it is often called, can project a three-dimensional image up to four metres across, given sufficient floor space. It lacks the interactive ability of the portable display but even that can be added for an additional Lv3000. It is widely used in medical imaging, engineering and museums, as well as the military.

Item	TL	Kg	Cost
Display Tank	12	120	Lv10000

FINGER SENSORS

These tiny motion sensors are attached to fingernails via a strong adhesive, allowing the hand to be used for typing and as a virtual input device when used with a HUD or other eye-monitor. They are normally used with a wearable nanocomp or a bodycomp and PAN, but for double the price they can make use of a normal wireless connection. They are not required in order to use the interactive features of holo displays or pico-projectors.

Item	TL	Kg	Cost
Finger Sensors	10	—	Lv10

FLEXIBLE MONITOR

A flexible 40 x 30 centimetres touchscreen monitor can be rolled into a tube.

Item	TL	Kg	Cost
Flexible Monitor	11	0.2	Lv100

HUD SYSTEM

The HUD (Heads-Up-Display) puts data and images on a reticule right in front of the user's eyes. It can be coupled to electronic sights on a weapon, to provide DM+2 to attack rolls. It can also be used with some sights to shoot around corners while only exposing a hand to return fire. More commonly, HUDs are coupled to electronics and sensors to provide eye-level information to mobile personnel, in both military and civilian situations. The small batteries in a typical HUD can power it for up to 48 hours of operation. A ruggedised HUD is made to operate under harsh conditions, including military use.

Item	TL	Kg	Cost
HUD System	11	0.2	Lv200
HUD System, Ruggedised	11	0.3	Lv400

PERSONAL AREA NETWORK

A PAN is a Personal Area Network, sometimes called a Body Area Network. PANs allow all the electronics carried by a person to be linked via a network that uses microcurrents conducted across the surface of the skin to convey information. Unlike other short-range radio-based networks, the PAN has no detectable signal and cannot be intercepted unless skin contact can be made. PANs can interface with a variety of devices, including nanocomps, bodycomps and portacomps, as well as implanted devices like subdermacomps and subdermatalks. Body sensors, including positional sensors and output devices like HUDs, can all tie into a PAN, making it integral to Augmented Reality systems.

Item	TL	Kg	Cost
PAN	11	—	Lv50

PICO-PROJECTORS

A pico-projector is a digital projector small enough to be combined with most electronic devices, allowing them to clearly project an image up to 200 centimetres diagonally on any suitable surface. Pico-projectors also include a pair of cameras that can track interactions with the projection, allowing screen/keyboard combinations to be projected almost anywhere. They are powered by the device they are connected to.

Item	TL	Kg	Cost
Pico-projector	11	—	Lv100

PORTABLE HOLO DISPLAY

A portable holographic display can be attached to a nanocomp, bodycomp or portacomp to provide a projected three-dimensional image within 10 centimetres of the projector. Sensors included as part of the display allow it to be used interactively. The included battery pack is good for six hours of operation.

Item	TL	Kg	Cost
Portable Holo Display	12	0.5	Lv400

PRINTERS

Hardcopy printouts of documents and other information are not common. Most documents, including legal documents, are electronic. However, there is a limited requirement for printed documents, especially on more primitive colony worlds that lack well-developed data infrastructures and ubiquitous Link connections.

The printer outputs to a sheet of silicon plastic, which can be reused dozens of times by the printer with no degradation. The printer simply melts the sheet into its reservoir and extrudes it as needed. Printers come with a reservoir of liquid plastic capable of printing 250 sheets.

Item	TL	Kg	Cost
Printer	9	1	Lv50
Reservoir Refill	9	0.2	Lv20

SMART PAPER

Smart paper is an interactive display technology. A sheet is scarcely thicker than a normal sheet of paper and can wirelessly connect to any authorised computer within five metres, acting as an input/output device. Using any pen, stylus or even a finger, it can be drawn or written upon and will record this to the computer. It can also be used to access the computer and run applications like a remote terminal, although the display technology has some lag, making it unsuitable for video or gaming.

Item	TL	Kg	Cost
Smart Paper	10	—	Lv5

SPRAY-ON VIDEO SCREEN

The spray-on monitor uses a frame that is set against the wall to spray a thin-screen monitor onto the wall. The frame is a 3D printer that lays down the electronic connections, then an array of spray-on picture elements, similar to LEDs or lasers, that create the image. A nanocomp is then connected to the electronic layer, and used to connect to the Link network or play media. Screens the size of an entire wall can be made this way. The image is passive 3D, so while almost as realistic as a holo system, it is far cheaper and larger. A spray-on video screen requires a nanocomp to control it.

Item	TL	Kg	Cost
Spray-On Video Screen	11	10	Lv10/m ²

STATIC DISPLAY

Often called a tri-d (tri-video), the static holographic display is a three-dimensional display unit aimed at the consumer market. Images vary from 70cm diagonally all the way up to 200 centimetres. While the image in the display is a full holographic image, the design of the static display means the image is only viewable from the front. The holographic display is not directly interactive but instead requires a remote, much like a pre-Twilight television. Many functions can be voice-activated as well.

Item	TL	Kg	Cost
Static Display	11	30	Lv800

STYLUS BOARD

A stylus board is a touch-sensitive screen that functions much like any other external monitor. However, it is capable of much higher resolution and includes a stylus for making precise drawings. Unlike many portable monitors, it is rigid but thin.

Item	TL	Kg	Cost
Stylus Board	11	0.5	Lv300

SOFTWARE

Comps of all sorts require software to run. This includes operating systems, applications, entertainment software and military software.

Memory Chips

A memory chip contains a greater volume of data than a typical small library. This is sufficient to provide an excellent working linguistic translation program or a comprehensive reference guide for a single area of scientific specialisation; a scientific reference chip does not make the user an expert in a field, however. Larger capacity chips are available but not common. Portacomp chip sizes are limited by the necessity for ease of handling rather than memory size.

Item	TL	Kg	Cost
Memory Chip	11	—	Lv11

Comp Operating Systems

There are four competing operating systems (OS) driving the various brands of comps. All have roughly the same capabilities and run similar software. Software written for one OS will not work on a comp running an alternative OS without intermediary software, like an emulator.

DIGITS

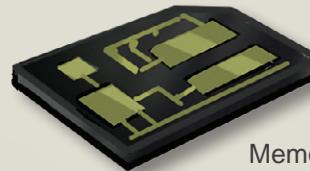
Digits started life as a lightweight OS for portacoms and nanocomps, and remains the most commonly encountered OS for mobile comp systems.

LINKABLE PSD (OFTEN JUST CALLED LINKABLE)

This OS is used in most Link phones and is quite common in nanocomps as well. It is uncommon to find this OS running on workstations.

METASTABLE (OFTEN JUST CALLED META)

A common OS for static workstations, it also drives most starship and spacecraft computers. MetaStable is almost never found on Link phones, although it does see some use in nanocomps used as hardware controllers.



Memory Chips

ORBIS OS

Manchuria's Orbis OS fills the same role as MetaStable but has a much smaller market share. It is only really used by Manchuria and some of its smaller client states. Orbis LS is the version designed for mobile comp systems and an even more pared down version is found in Manchurian Link phones and gaming devices.

Civilian Software

Software is purchased either on a large-capacity datachip or, more commonly, downloaded through the local Link network. In some urban areas, as well as in the Core, practically any program can be accessed through the Link, without requiring a download. This is a service that costs Lv10 per month.

EMULATOR

Emulator software is designed to allow software written for one type of comp to be used on another. There is usually a penalty in performance for this flexibility. Emulators add their Bandwidth to that of the software to determine total Bandwidth requirement.

ENTERTAINMENT SOFTWARE

Games and other entertainment programs are available through chip kiosks and Link download sites on almost all worlds. Possession of game software will add +1 to the Comfort Rating (to a maximum of +4) on interstellar journeys. This increase to the Comfort Rating lasts for as many days as twice the Bandwidth of the software.

IMAGING SOFTWARE

This software is designed to assist in the creation and manipulation of artistic images, including photographs. By law, changes made by the software have to be recorded in the metadata digitally encoded in the photo or image, so retouched photos can be restored to their original format. Use of this software grants DM+1 to Art (holography or visual media) checks. Imaging software requires an input/output device, like a touchscreen or stylus board.

LANGUAGE CRACKER

The language cracker is software that analyses a spoken or written language and attempts to discover contextual similarities between it and the native language of the program. This is a slow and painstaking process with considerable trial and error involved. The language cracker chip confers DM+2 to Science and Language checks made to do this. It can also allow a Traveller to learn a language without a native speaker.

MAPPING AND SURVEY

This is designed to collate data from multiple sources to create a detailed map. Depending on the sources, this can also include areas of likely resource interest. Data sources can include satellite imaging, drone data, seismographic data and observations from trained

personnel. On worlds with survey robots, these robots can contribute a great deal to the metabase used to create the maps.

PLANETARY REFERENCE LIBRARY

This is a specialised library devoted to a particular world. Having access to the reference library grants DM+1 to Survival checks for the planet in question.

REFERENCE GUIDE

A comprehensive reference guide on any one subject is available on chip for a modest price. Possible subjects include (but are not limited to); biochemistry, physics, chemistry, geology of any well-explored world, political history of any inhabited world and so on. These guides are available for any Art, Engineer, Mechanic, Medic, Profession or Sciences skill. Using these guides doubles any time required for a check but allows the user to add the guide's Bandwidth as a DM. Use of a reference guide also allows an unskilled user to attempt a check with DM-3 plus the Bandwidth of the guide but the time for the attempt is multiplied by 10.

TRANSLATION CHIP

The translation chip will translate known spoken or written languages. It is purchased with two complete languages on the chip (English-German or Tajik-Farsi, for example) and will translate from one to the other at command. This program can also provide near real-time translation of voice input.

Civilian Software

Item	Bandwidth	TL	Kg	Cost
Emulator	1	11	—	Lv80
Entertainment Software	1–4	11	—	Lv10 per Rating
Imaging Software	3	11	—	Lv200
Language Cracker	4	12	—	Lv300
Mapping and Survey Software	4	11	—	Lv1000
Planetary Reference Library	4	11	—	Lv2000
Reference Guide	1	11	—	Lv200
Reference Guide	2	11	—	Lv400
Translation Chip	2	11	—	Lv100

Military and Security Software

Military users will also make use of civilian software, in particular mapping software. Military software, on the other hand, rarely has legitimate civilian uses.

ARTILLERY CONTROL

This software is used with a portacomp, typically a ruggedised model, and often takes results from mapping and survey software to use in artillery plotting. It is tied into local navigation satellites for precise positioning; this is why many modern military starships carry enough navsats to create a constellation around a target world. It can be used to call down precise artillery strikes at areas designated on its map board. Use of this function of the computer can be tied into any modern (TL11+) artillery. The artillery control software adds a DM+1 per Bandwidth of the software to Heavy Weapons checks against static targets, and half that against mobile targets.

More advanced nations have access to better software, and the advanced artillery control software is an example of that.

DRONE CONTROL

This controls a drone without human intervention. The software generally has a number of specialisations, including recon, surveillance, and hunter/killer, though

most military forces require a human be in the decision loop for hunter/killer units; there have been cases of the software acting without orders. The controlling comps in those cases were also running tactical analysis programs and the working theory is that the software somehow ‘ordered’ the drone to take the shot, based on its analysis of the situation.

FILTER PROGRAM

A filter program analyses and extracts random noise from electronic transmissions, like the audio noise in a SensuPress or the video distortion of a holofield.

Cleaning up audio: Difficult (10+) Electronics (comms) check, (3D minutes, EDU)

Cleaning up video: Formidable (14+) Electronics (comms) check (3D hours, EDU).

The Processing score of the computer can be used as a DM for these checks.

TACTICAL ANALYSIS

Tactical analysis software is an example of a battlefield expert system. It analyses tactical information available to it and provides tactical advice and delineates possibilities – limited by the quality of information available. The tactical analysis program grants DM+1 to Tactics (military) checks. If excellent information is available from a variety of sources, like drones, recon teams and satellite imaging, then the software provides DM+2.

Military and Security Software

Item	Bandwidth	TL	Kg	Cost
Artillery Control	1	11	—	Lv1000
Artillery Control	2	11	—	Lv2000
Artillery Control	3	11	—	Lv3000
Artillery Control, Advanced	2	12	—	Lv10000
Artillery Control, Advanced	3	12	—	Lv15000
Artillery Control, Advanced	4	12	—	Lv20000
Artillery Control, Advanced	5	12	—	Lv25000
Drone Control	1	10	—	Lv1000
Filter Program	4	11	—	Lv1200
Tactical Analysis	4	12	—	Lv20000

Decryption

Software capable of breaking encryption is tightly controlled and typically would not be found in front-line military units. Such software is not available on the open market and even possession is often illegal (controlled at Law Level 4, illegal at Law Level 6 and a capital crime at Law Level 10).

Code breaker software uses its Bandwidth as a DM in attempts to break encryption. Breaking encryption requires an Impossible (16+) Electronics (computers) check (1D days, INT).

Item	Bandwidth	TL	Kg	Cost
Code Breaker	1	12	—	Lv20000
Code Breaker	2	12	—	Lv40000
Code Breaker	3	12	—	Lv60000
Code Breaker	4	12	—	Lv80000
Code Breaker	5	12	—	Lv100000
Code Breaker	6	12	—	Lv120000
Code Breaker, Shadow Market	1	12	—	Lv100000
Code Breaker, Shadow Market	2	12	—	Lv200000
Code Breaker, Shadow Market	3	12	—	Lv300000
Code Breaker, Shadow Market	4	12	—	Lv400000
Code Breaker, Shadow Market	5	12	—	Lv500000
Code Breaker, Shadow Market	6	12	—	Lv600000



COMMUNICATORS

Communicators allow the transmission of information, including data, voice and video, over long distances. There are various types of communicators available; civilian ones tend to be lower-powered (meaning shorter-ranged) than their military counterparts and also broadcast in a wider arc (making transmissions easier to intercept).

Hand Communicator

A hand communicator is a battery-powered, handheld radio unit that broadcasts voice and low-resolution video signals at relatively low power. The internal batteries last for up to 36 hours.

Longer-ranged hand comms are also available, replacing the backpack communicators common during the Central Asian War.

Microcomm

The microcomm consists of a small adhesive patch that attaches behind the ear and uses a PAN to connect to a transceiver located somewhere else on the body, typically on the upper arm or wrist. All functions of the microcomm are voice-controlled and the patch is sensitive enough that it can pick up sub-vocalised commands and communications. Microcomms are powered by body heat and effectively have unlimited power.

Throat Communicator

This is the most common personal battlefield communications device next to the hand communicator. It is a small, saddle-shaped device

that rests on the front of the throat, over the user's larynx. A throat communicator allows a Traveller to make radio communications while keeping their hands free for other tasks. The unit is battery powered and automatically activated when the operator speaks. The throat communicator includes a battery pack good for 24 hours of operation.

Tight Beam Up-Link Communicator

A tight beam communicator is designed to provide secure communication between a ship in orbit and a ground party. The communicator can be used while moving but requires a Routine (6+) Electronics (comms) check (1D seconds, EDU) every round to remain locked on. Prior to the ground party's landing, the communicator's microprocessor is programmed with the ship's orbit and the communicator's inertial locator constantly updates its position relative to the ship. When activated, the communicator will point its dish antenna toward the ship's present location and establish a tight beam link, provided the ship is above the horizon.

In most orbits, the ship will be in an acceptable uplink position roughly 20 percent of the time. The higher the orbit of the ship, the longer the period of possible contact but the greater the dead time between relayed communications. Two up-link communicators can be used for secure ground communication if a communications satellite is overhead and both are linked to the satellite at the same time.

Item	Range	TL	Kg	Cost
Hand Communicator	20 km	9	0.5	Lv50
Hand Communicator, Encrypted	20 km	9	0.5	Lv200
Hand Communicator, Long Range	100 km	10	0.5	Lv50
Hand Communicator, Long Range Encrypted	100 km	10	0.5	Lv200
Microcomm	5 km	10	0.1	Lv75
Microcomm, Encrypted	5 km	10	0.1	Lv1200
Throat Communicator	5 km	10	0.1	Lv75
Throat Comm, Encrypted	5 km	10	0.1	Lv300
Tight-Beam Up-Link Communicator	Orbital	11	8	Lv1500
Tight-Beam Up-Link Communicator, Encrypted	Orbital	11	8	Lv6000

ANIMALS

The first settlers from Earth carried animals with them, frozen in the ship's hold. Later colonists carried animals as embryos and used exo-wombs to bring them to parturition. Animals were brought to the colonies to serve as companions and work animals but were primarily sent as a source of protein and all the other useful materials an animal can provide. Meat and animal products are a staple of trade between colonies but very little is exported back to Earth or Tirane. Initially, many colonies use animals as beasts of burden for subsistence farming, until adequate machinery can be brought in. In many cases, colonists prefer to use animals rather than take out loans or mortgages to pay for offworld equipment and poorly-supported colonies, like those of the Incan Republic, make heavy use of animal power.

Vat-grown meat, or carniculture, became popular on Earth in the late 2240s and with it came strong animal rights movements. By the 2280s, the production and consumption of animal-sourced meat, if not outright banned, became strongly stigmatised in most countries. Milk, eggs, beef, chicken and any other animal product could be produced through some variety of the carniculture process. Farming is still done on Earth, for vegetables, grains and the immense quantities of soy proteins required as nutrients for the meat factories. In terms of energy and land use, producing a kilogram of beef from a cow is far more efficient than from vats. However, in the Core, energy from solar power arrays and industrial fusion plants is almost free and with concentrations of population, factories can be very effective. Aside from a few connoisseurs, no one can tell the difference between free-range beef and beef grown in vat as long strings of muscle fibre, twitching under constant electrical impulses to maintain tone and consistency.

On most Frontier worlds, carniculture has failed to achieve market penetration. In general, colonies do not have the extensive power networks and abundant energy that make meat factories viable. On top of that, however, is another factor; most colonists

practically make a religion out of self-reliance. For many, it was one of the main reasons they, or their parents or grandparents, chose to emigrate from Earth. Carniculture is only viable in bulk production and even then the power requirements put the technology out of reach of the average homesteader or even Frontier towns. However, a family can easily raise enough cattle, chickens and pigs to not only feed themselves but sell or trade for other necessary goods. They do not need to rely on central agencies or corporations to do this, either.

Life Support Requirements

Livestock and other terrestrial animals have similar life support requirements to people. Each animal in this chapter is listed with how much concurrent life-support they require, compared to a human. For example, a horse requires four times as much life support as a human. So while two people could inhabit a stateroom, or even four under cramped conditions, a horse under crowded conditions takes up the equivalent of an entire stateroom by itself. This also applies to frozen sleep, with a hibernaculum for a horse being four times the size of an individual person's frozen sleep capsule.

Transporting Animals

In the early days of colonisation, worlds would import a few mature animals along with a number of new-born young. Later it would just be embryos with a few mature females to bring them to term. Exo-wombs have since taken that duty, so now when animals are exported to Frontier worlds, it is usually just as fertilised eggs.

New-born animals cost $0.1 \times$ the cost of an adult and have life support requirements equal to $0.1 \times$ of an adult's. An individual fertilised egg in a support tube requires negligible space and costs Lv50.

Adult animals are notoriously difficult to transport, especially cows and horses, although llamas and smaller animals are easier. Getting large livestock to orbit costs roughly 10x the cost of getting a human there.

DNA Modified Livestock

Most livestock sent to Frontier worlds undergo some form of low-level genetic modification to adapt them to new environments. Animals, like people, are subject to Planetary Adaption Syndrome, which is alleviated through genetic manipulation. The moratorium on genetic engineering in humans has not led to a ban in animal geneering but various watchdog agencies keep a close eye on breeding centres, lest they turn out to be a cover for clandestine DNA modification programmes. Indeed, in 2294, several researchers at the University of Western Ontario, along with colleagues at the Agricultural School of Adelaide, were arrested on charges of human genetic tampering. Their case is still before the courts but speculation is that the template they had created for cattle on Aurore could be modified for people, as there is no specific DNA modification for that world.

Livestock are also modified for other reasons, either to improve output of milk, young or meat and other products. Food animals are never modified for improved intelligence or loyalty.

Burrowvarg

Burrowvargs are a popular pet and guard animal on Beta Canum, where they are native. While popular, their incompatible biology makes travelling off Beta Canum, as they require expensive imported or artificial food.

Animal	Hits	Speed	Life Support	Cost
Burrowvarg	8	8 m	½	Lv200
Skills	Athletics (dexterity) 1, Melee (natural) 1, Recon 1, Survival 1			
Attacks	Bite (D3)			
Traits	Heightened Senses, Small (-2)			
Behaviour	Carnivore, Chaser			

Cow

The cow is one of the most economically important animals on any colony world. They are still one of the most important protein sources for most colonies, along with other meat animals like pigs, chickens, rats and catfish.

Animal	Hits	Speed	Life Support	Cost
Cow	35	6 m	x5	Lv4000
Skills	Melee 0, Survival 0			
Attacks	Kick (2D)			
Traits	Large (+1), Tough (+3)			
Behaviour	Herbivore, Grazer			



Burrowvarg

Dog

As opposed to a neo-dog, this is standard large breed dog, like a Rottweiler or German Shepherd, that is very common on Frontier world as household pets and guard animals.

Animal	Hits	Speed	Life Support	Cost
Dog	10	10 m	½	Lv500+
Skills	Athletics (dexterity) 2, Melee (natural) 1, Recon 1, Survival 1			
Attacks	Bite (1D)			
Traits	Heightened Senses, Small (-1)			
Behaviour	Carnivore, Chaser			

Horse

When the Neo programme was scrapped in the early '80s, the horse had been next in line to receive modifications. This was in preparation for becoming a companion animal for the new wave of colonies many were expecting. The closure of the programme changed that and the ongoing Consolidation on the French Arm spelled the end, at least for the time being, of new colonies in that region of space.

Today, there are limited numbers of horses on the Frontier, largely on older colony worlds that can afford the luxury of keeping what is essentially a large pet. Montana and a few other worlds are exceptions, where horse ownership has become common. Horses are also sometimes seen on newer colony worlds that do not have an industrial infrastructure, as a work animal in subsistence-level farming. Many

colonists prefer to keep using animal power well after machinery becomes available, due to the expense. However, for anything much beyond subsistence-level farming, machinery is required.

Animal	Hits	Speed	Life Support	Cost
Horse	32	12 m	x4	Lv4000
Skills	Athletics (strength) 3, Melee 0, Survival 1			
Attacks	Kick (2D)			
Traits	Large (+1)			
Behaviour	Herbivore, Grazer			

Llama

The llama is an important food and textile source across South America and has been extensively exported to many colonies due to its hardiness and the quality of its meat and wool.

Animal	Hits	Speed	Life Support	Cost
Llama	10	8 m	x1	Lv3000
Skills	Athletics (strength) 2, Melee 0, Survival 2			
Attacks	Bite (1D)			
Traits	Large (+1)			
Behaviour	Herbivore, Grazer			

Pig

Even among farmers and ranchers on the Frontier, there is some controversy surrounding the use of pigs as food animals, as they are smart enough to potentially qualify for proto-intelligence status. However, the argument was raised that while wild pigs may be smart, domesticated pigs are not, after centuries of breeding for meat and docility.

Animal	Hits	Speed	Life Support	Cost
Pig	10	8 m	x1	Lv2000
Skills	Melee 0, Survival 1			
Attacks	Bite (1D)			
Traits	Tough (+2)			
Behaviour	Omnivore, Scavenger			

Small Animals

Smaller animals have an abbreviated description, with any relevant skills noted. All domestic animals have Survival 0.

Animals yield approximately 1/3 to 1/2 of their mass in meat, smaller animals providing proportionately larger amounts of meat than larger ones.

CAT

Cats are highly adaptable and found just about everywhere humans go, both as companions and biological pest control. Their cost is highly variable, from adoptions from an animal shelter to a high value for a pure pedigree. While pedigree cats are very rare on the Frontier, there is some market for them, particularly large breeds like the Savannah.

Animal	Size	Hits	Speed	Life Support	Price	Traits
Cat	5 kg	3–5	6 m	1/10	Lv10-2000	Small (-3), Fast Metabolism (+1), Heightened Senses
Chicken	10 kg	6	2 m	1/6	Lv5	Small (-3)
Goat	40 kg	8–13	6 m	1/3	Lv150	Small (-1)
Rabbit	4 kg	0	10 m	1/30	Lv20	Small (-3), Heightened Senses
Rat	0.5 kg	0	4 m	1/100	Lv5	Small (-4)
Sheep	50 kg	1	8 m	1/3	Lv200	Small (-1)
Small Dog	8 kg	3–5	8 m	1/8	Lv10–2000	Small (-3), Heightened Senses
Turkey	20 kg	7	2 m	1/6	Lv7	Small (-2)

CHICKENS

Both as egg-laying birds and meat animals, chickens are one of the most common livestock animals in human space, surpassed only by rabbits. Chickens are easy to take care of and, on worlds with compatible biologies, can largely fend for themselves.

GOATS

Goats are useful for their milk, meat, hair and skin. Another easy-to-care for animal, caution must be taken with them in compatible ecosystems that they do not simply eat everything in sight. As browsing ruminants, they can digest just about anything. Goats are smart and famously obstinate. They get along very well with sheep and occasionally interbreed.

RABBITS

Rabbits are another small animal that make an excellent meat source for Frontier life, being hardy and easy to care for, with impressive meat and pelt yields. The only drawback to them is that they frighten easily and can even be scared to death.

RATS

Rat meat has long been a delicacy on Earth, ever since Twilight, and is one of the more popular choices from the carniculture vats. On the Frontier, rats are used as food animals on worlds where the local

biology is either marginal or incompatible with terrestrial life. In these places, the rat's legendary adaptability and ability to eat almost anything is put to good use.

SHEEP

Sheep are valued more for wool than meat, although that too has value on the Frontier. Wool is one of the few animal-based commodities that finds a ready market with clothing makers in the Core, and with sheep ranches few and far between on Earth and Tirane, most trade in wool comes from the colonies. Wool is a major cash crop for Alicia on Beowulf, Neubayern and Crater.

SMALL DOG

Small dogs are largely bred as companion animals, although in some places they are also used for pest control in much the same way as cats. The highly variable price ranges from a mixed breed animal adopted from a shelter up to a purebred show animal, although the latter is very rare on the Frontier.

TURKEYS

Bred largely for meat, turkeys yield nearly 2/3 of their body mass in edible portions. They are slightly more difficult to care for than chickens, largely because they are even less intelligent.



ANIMALS EQUIPMENT

While animals are not a large part of any colonisation effort, they may be present as companions, work animals and food animals. On some colonies, whether for cultural or financial reasons, they take on much bigger roles, sometimes becoming the primary source of transportation.

Canine Body Armour

Service dogs are often armoured to support their roles in military and police services. On the Frontier, this added level of protection allows them to pursue local wildlife through alien brush with considerably reduced risk of injury, not to mention the risks associated with tangling with an alien carnivore.



Exo-womb

Exo-wombs are used to gestate animals from a fertilised egg up to normal birth size. While it is technically possible to use exo-wombs for human gestation, there are significant ethical concerns. Most nations outlaw the practice, although the United States and Australia created an exception for citizens on their joint colony of King.

The industrial exo-womb can incubate and decent up to four cows or horses at a time. Gestation period is as normal for the species and exo-wombs can be used for practically any animal. This large machine requires power and a protein-rich nutrient source.

Item	TL	Kg	Cost
Exo-womb	11	6,000	Lv20000

Riding Tack

This is a basic saddle, blanket and bridle needed to ride a horse. Similar equipment exists for camels and elephants.

Item	TL	Kg	Cost
Riding Tack	3	25	Lv800



Armour Type	Protection	TL	Rad	Kg	Cost	Required Skill
Canine Body Armour	+6	10	0	4	Lv800	None

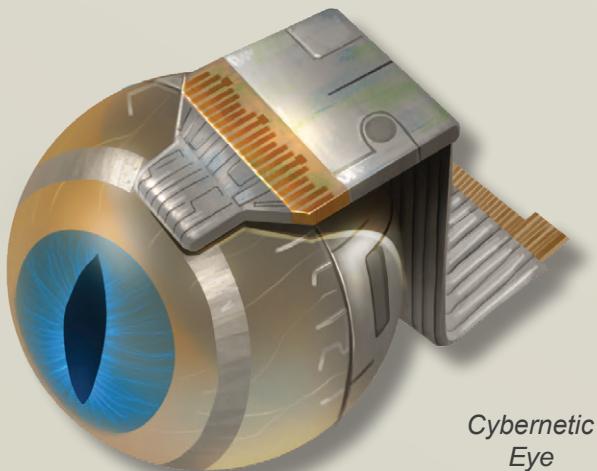
Animal Cybernetics

Cybernetics are available for animals, although the selection is more limited. They are generally not prosthetic devices, that is, typically not used to replace a badly injured or missing body part. Such might be considered for a very valuable breeding animal, however. Instead they are usually bionics, extending the capabilities of the animal, either as an intelligence gathering platform, guard animal or, in very rare cases, a weapon.

On the Frontier, these cybernetic modifications are very rare and in almost all examples originate in the Core. Most famous of these is the apocryphal 'Assassin Cat', a large domestic cat of no particular breed that, according to stories, was equipped with a control rig, neural sheathing, muscle implants, cybernetic eyes, carboglass fangs and a poison injector in the fangs. In these tales, the Assassin Cat would lie in wait for its target and the last thing they would see would be the red flash of its eyes as it darted in to bite them, injecting a fast-acting neurotoxin. The last act of the Assassin Cat would be to bite off a finger as proof of its kill and go scampering off.

While this is almost certainly fiction, all the modifications the animal is supposed to have are possible, although extremely expensive. It is also worth noting that when the infamous vice-lord Raj Ahliwalhia was killed in his apartment in the Shambhala Habitat in the C1 system, he had been injected with a neurotoxin, and one finger had been removed, apparently with a very sharp knife.

The listed augmentations are identical in effect to those starting on page 19 of *2300AD Characters and Equipment*.



Modification	Restrictions	Price
Combat Implant	Animals 50 kg and larger	Lv16000
Cybernetic Ears	None	+200%
Cybernetic Eyes	None	+200%
Cybernetic Limbs	Animals 5 kg and larger	+500%
Hypercharger	Animals 25 kg and larger	Lv12000
Implant Weapons	Edged weapons only	+300%
Muscle Implants	Animals 1 kg and larger	Lv1000
Neural Sheathing	Animals 1 kg and larger	+200%
RFID Chip	Insects and larger	Lv50
SubdermaComp	Animals 10 kg and larger	Lv5000
SubdermaTalk	None	+100%

Cybernetics developed specifically for animals are normally based around training and control. Similar units could be made for humans but control rigs would be extremely illegal.



Control Rigs

Control rigs are implants that tap into the animal's brainstem, along with an array of electrodes across the brain. After a day spent mapping the connections, the animal can be controlled by a remote operator. Cybernetic eyes and ears are typically also installed to assist the remote operator; otherwise the animal has to remain in line of sight. In most situations, control rigs are used to monitor the animal and, if necessary, alter their movement. These systems are most commonly used in guard and surveillance animals, and can be used in anything right down to microscopic animals like rotifers. Insects are frequently the recipients of control rigs, as part of recon and attack swarms.

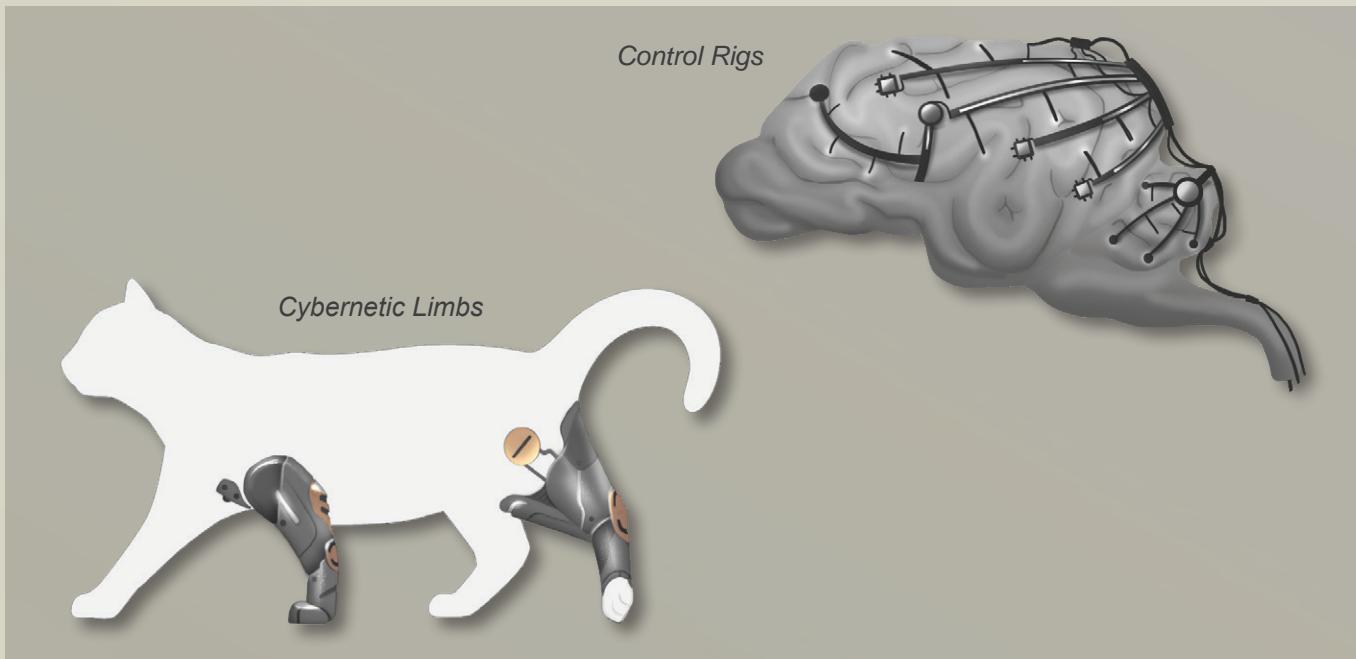
The cost of control rigs varies depending on the size of the animal being controlled; the bigger the animal, the more it costs.

Control Rig Class	Tech Level	Animal Size	Price
A	10	500 kg +	Lv10000
B	10	50–500 kg	Lv7000
C	11	5–50 kg	Lv5000
D	11	0.5–5 kg	Lv1000
E	11	0.05–0.5 kg	Lv500
F	12	Insect	Lv100
G	12	Microscopic	Lv500

Training Implants

Training implants are similar to control rigs; the array of nanowire electrodes is less extensive but more targeted. The net effect of training implants is to allow an animal to quickly learn a new set of skills, with the implants acting as sources of both positive reinforcement and punishment. Training implants are categorised in much the same way as control rigs, although considerably cheaper.

Training Implant Class	Tech Level	Animal Size	Price
A	11	500 kg +	Lv5000
B	11	50–500 kg	Lv3500
C	12	5–50 kg	Lv2500
D	12	0.5–5 kg	Lv500
E	12	0.05–0.5 kg	Lv250



PENTAPOD EQUIPMENT

Pentapod analogues exist for much of the equipment normally available, with the exception of electronic devices. Such tools and devices are difficult to find outside of Beta Canum on the French Arm and not widely exported. If an analogue is available, it costs at least twice as much as normal equipment but will last for many years, since as a living creature it self-repairs. Rough treatment will kill a Pentapod analogue but may as easily break human equipment. Note that, in general, a Pentapod analogue for a piece of equipment is generally not as strong or useful as the human-made equivalent, and such tools and equipment suffer DM-1 to all checks that make use of them.

CONSUMER PRODUCTS

Aside from analogues to human devices, Pentapods make a number of items designed specifically for use by humans. It is a running joke on the French Arm that Pentapod efforts are hit-and-miss with some products doing very well and others failing to catch on, largely due to poor aesthetics or a touch of body horror.

Biocontacts

Biocontacts were among the first successful Pentapod products for human consumption. They were widely distributed across the Fronteir at low prices, both as a marketing experiment and a means of developing a distribution system. Biocontacts are transparent lenses worn in the eye. When purchased they are dormant and opaque. The purchaser must insert them, keep their eyes closed and remain at rest for eight hours to activate the contacts and allow them to adapt to their body chemistry, normally during a sleep



Biocontacts



Biosampler

period. Once activated, the biocontacts are specific to the owner and will not function for anyone else. They can be removed and stored or kept in the eyes indefinitely (they allow oxygen to pass freely to the cornea). They draw nourishment from the owner's tears and so must be stored in a special nutrient solution if not kept in the eyes.

Biocontacts give the wearer enhanced infrared vision (for night vision) and squinting will give up to a 5x magnification.

Item	TL	Kg	Cost
Biocontacts	N/A	—	Lv1000

Biosampler

The biosampler was among the first Pentapod products mass-produced for human consumption and the most successful. It is an animal biochemically similar to a human being, programmed to determine edibility of plant and animal tissue. If it will eat or drink something, it is safe for a human to eat. Notably, they refuse to drink anything with alcohol or caffeine.

Although appearance is unimportant to its function, the Pentapods have, in one of their few marketing successes, made it soft and furry and programmed a limited pattern of semi-random behaviour to make it more appealing. This pattern becomes predictable but the creatures have become popular as children's pets.

on many Frontier worlds. The Pentapods release a new version every few years, differing only cosmetically from those before. However, few people are willing to 'upgrade' their biosamplers. If cared for properly, a biosampler can live 10–15 years.

Animal	Hits	Speed
Biosampler	3	3 m
Skills	Survival 3	
Attacks	—	
Traits	Small (-3)	
Behaviour	Omnivore, Eater	
Mass	0.5 kg	
Price	Lv50	

Biosuit

The biosuit is a new product from the Pentapods and is essentially a living protective suit. It has limited effectiveness against weapons but protects against toxins and biological agents. It still requires a human-



breathable environment but is capable of ingesting just about any biological matter. It even recycles the user's own waste, extracting water and other nutrients. With a small supply of water and biomass, the suit can keep its wearer alive indefinitely in almost any terrestrial environment. It is not suitable as a hostile environment suit, however, nor as a pressure suit.

Compass

The Pentapod compass was largely a commercial disaster. While functional, it is very unappealing. It looks like a rounded lump of slimy translucent jelly that quivers on occasion, regardless of external stimuli. Within the jelly are a cloud of gold-tinted flecks. On worlds with a magnetic field, the flecks group on the north side of the slime jelly. The compass will stick wherever it is placed and although it may look in danger of oozing away, it always retains its shape. It requires little in the way of food or water, save in arid environments.

Item	TL	Kg	Cost
Compass	N/A	0.5	Free

Earplugs

Hearing protection is an easy enough proposition, as exceptionally-fast computing can automatically filter incoming sound to reduce or remove excessive noise and distortion; it is possible to have a mostly clear conversation while standing beside a running jet engine. However, this technology, as good as it is, is not effective for long term use, especially planetside where background noise can provide a constant irritant in day-to-day life.

Pentapod earplugs were one of the early successful Pentapod products, after biocontacts. These earplugs are living creatures that sit in the ear canal, selectively filtering out certain sounds; loud noises, continuous droning and similar irritants, without affecting normal conversations or the sounds of danger that often lurk on worlds of the Frontier. The earplug can live in the ear canal, subsisting off sweat and earwax, for up to two days before they need to be returned to a nutrient solution for at least four hours.

Item	TL	Kg	Cost
Earplugs	N/A	—	Lv300

Armour Type	Protection	TL	Rad	Kg	Cost	Required Skill
Biosuit	+4	N/A	—	10	Lv900	None

Pentapod Exo-womb

The Pentapod exo-womb can incubate one animal at a time, up to the size of an ox. The main difference between Pentapod and human designs is that the Pentapod exo-womb can bring the animal to term in a fraction of the time. For example, the gestation period for a horse is approximately 340 days; the Pentapod exo-womb can bring it to term in 35 days. Typical accelerated times for large animals (50+ kilograms at maturity) are 90% faster. For smaller animals this drops to 50%.

Many find the Pentapod exo-womb to be disturbing biotech. Despite this, it is rapidly coming into widespread use on ranches across the French Arm due to its superior features.

While it is unquestionably alive, it is basically a limbless lump with a rudimentary head. The head

is featureless save for a wide mouth that usually seems to be smiling in an oddly human, although utterly vacant, smile. The expressions made by this 'mouth' are the creature's way of communicating requirements and problems.

Pentapod exowombs require 50 kilograms of biomass per day but are not choosy about what they consume, save that it has to be ground to a paste. They have no real 'food-mouth', just a sphincter that a handler can shovel food into.

Animal	Hits	Speed	Life Support	Cost
Pentapod Exo-womb	50	0 m	x6	Lv500000
Skills	Animals 1, Profession (exo-womb) 3			
Attacks	—			
Traits	Large (+3)			
Behaviour	Omnivore, Eater			

Food Converter

The food converter was a later product for the human market, which failed spectacularly. It resembles a slow-moving, short, fat snake, capable of converting dextro-amino acid proteins and complex carbohydrates to levo-amino acid proteins and carbohydrates suitable for human consumption. It was even capable of synthesising some vitamins, including the B-complex series but not vitamin D. Unfortunately, Pentapods only accounted for function, not aesthetics and, in this case, the aesthetics were disastrous. Not for the creature itself, which was merely unpleasant but for the results. Essentially, it was fed food to be converted and in the digestion process, it converted the amino acids and complex carbohydrates, taking what it needed and excreting the rest. This excreted matter would then be eaten. No one would eat this and the converter languished in Pentapod storage cysts.

The converter can alter one kilogram of food per hour.

Animal	Hits	Speed
Food Converter	4	1 m
Skills	Survival 2	
Attacks	—	
Traits	Slow Metabolism (-2), Small (-3)	
Behaviour	Omnivore, Eater	
Mass	4 kg	
Price	Free on Beta Canum	

Pest Controller

With the failure of the compass, Pentapod engineers came up with a new use for the repellent organism. Retaining the core glob of slime, the designers added a base of attractive shell-like material, along with a whorled iridescent cage, largely obscuring it. An attractant was added to the glob and it is seemingly irresistible to most insects and insect-like pests. Upon flying through the cage and touching the glob, pests are trapped and rapidly absorbed. Interestingly, it still retains the compass function.

Item	TL	Kg	Cost
Pest Controller	N/A	0.5	Lv80

Water Breather

In late 2299, Pentapods released a new product on the market, the water breather. It is a shelled creature that fits tightly to the human face, with a clear section over the eyes, a tube that projects into the mouth and an expandable sac at the chin. The sac expands as the wearer exhales and contracts as the wearer inhales. Meanwhile, the creature filters oxygen and food out of the surrounding water and exudes it into the sac, while filtering carbon dioxide out of exhaled air. If the breather is to be kept out of water for more than an hour, it must be placed in its water-filled carrying case.

Water Breather



The water breather is one of the few successful exports to other Arms of human space. As soon as they were released, the Life Foundation ambassador to the Pentapods placed an order for 1,000 and had them shipped to New Austin. The water-breathers quickly became very popular with colonists around Cousteau and many divers grew attached to their breathers, almost like pets.

If the water breather is taken off while in water, it will begin to slowly swim around in a circle. It is possible to train a water breather, although this can take a long time.

Animal	Hits	Speed
Water Breather	3	2 m
Skills	Survival 1	
Attacks	—	
Traits	Aquatic, Small (-3)	
Behaviour	Omnivore, Eater	
Mass	0.5 kg	
Price	Lv800 on the Manchurian Arm	

Packing Seed

This is an agricultural product created by the Pentapods and commonly used with pod plants. Packing seed plants are small, hardy bushes that produce a fruit with a tough skin that shrinks when dried, placing the fibrous meat inside under considerable pressure. When used as a packing material, an item is placed inside a container, packing seed is dumped around it and a sharpened stick is run forcefully down through the fruit, rupturing the skin and allowing the meat inside to expand and fill the container. It can be a little

difficult to remove but it absorbs shock well, making it excellent packing material for items shipped by orbital catapult.

The Life Foundation is currently testing a new variant of packing seed. While the fruit of this plant is identical to previous variants, it has been modified to fix nitrogen in the soil, making it an ideal companion plant to the variant pod plant.

Mass and price are for one cubic metre of expanded material.

Item	TL	Kg	Cost
Packing Seed	N/A	2	Lv1

Pod Plants

Pod plants are a Pentapod creation that has become a very common crop on colony worlds, particularly along the French Arm. Current varieties require terrestrial-compatible soils to grow but the enclave on Beta Canum is working on producing them for other worlds. It is a hardy, dark green vine that produces pods similar to Terran gourds but with much stronger shells (as strong as thick oak) after aging. Genetic testing indicates the 75% of the plant's DNA comes from terrestrial watermelons. Pods can be harvested when they reach a size of one quarter of a litre interior volume but if left to grow can attain volumes of up to 500 litres. While growing, they can be easily shaped by putting them in a form or mould. Pods can be grown to nearly any shape and size before harvesting, making them of great use as crates, barrels, furniture, canteens or many other commonly needed items. They are even sometimes grown as sculptures.

While the interior pulp in current varieties of the pod plant is inedible, the Life Foundation is testing a new variety provided by Outward Ventures, the Pentapod 'corporation' that runs the enclave on Beta Canum. This new variant includes edible pulp with high protein content, including the full range of vitamins required for human health. It requires additional water and fertiliser, and depletes soil of nitrogen in only one or two seasons.

Once the pod is harvested, it is opened and the pulp scooped out. The seeds are removed from the pulp for the next crop. The shell is then air cured for several hours, drying and hardening the interior. Fittings such as resealable necks, hinges, latches, or handles are then added if the pod is to become a reusable container. If the pod is to be a shipping crate, the item to be packed is placed inside, and packing material inserted. Two common packing materials are



an expanding foam similar to SofStuf and packing seed. The opening is then reclosed by gluing the piece removed back into place, making an airtight seal.

Item	TL	Kg	Cost
Pod Plants	N/A	1–500	Lv1–50
Pod Plant Seed	N/A	—	Lv5 for 10 seeds

Stabiliser

The stabiliser is an organic cocoon nearly two metres long and a metre in diameter. Its tough opaque outer shell protects delicate organs inside that can function in place of those of a comatose human being for an indefinite period of time – as long as it takes to get the patient to a medical facility. The stabiliser splits along one side to open and the patient is placed naked inside. As the stabiliser is closed, tiny projections pierce the patient's circulatory and nervous systems, providing nutrients, removing waste and controlling pain. A chemical released into the blood halts the patient's respirations while they are inside the stabiliser. As long as the construct has oxygenated air to breathe, water to drink and food to consume (about twice that required by a single human), it will remain in operation; patients left inside for more than a month begin to rapidly lose muscle tone, body weight and joint flexibility due to lack of exercise. Of course, this is a small price to pay for remaining alive while critically wounded. This current version is much improved from the original, which only provided a week of full support. The stabiliser is the subject of a number of rumours and horror stories associated with a fear and distrust of Pentapod technology and the Pentapods themselves.

The Story of Frank

Pentapod society is fractured in a way that humans do not really understand, with hundreds of nations, dozens of shifting alliances and factions, and at least three major power blocs. Pentapods, for their part, do not have a clear understanding of how human society functions either. The notion of 'aesthetics', for example, is just confusing to them. They are eager to learn, however, about aesthetics and so much more in human society.

That is where Frank comes in. 'Frank' was the nickname given to a Pentapod liaison operating with a human team on Aurore. This liaison seemed to have a much higher level of free will and initiative than most other Pentapods; it was active, curious and talkative, and even learned to only talk with two or at most three of its voices. This Frank was so unusual that initially other Pentapods on the expedition tried to kill them. Later, the others realised their value. Frank became something of an expert on humans, so much so that their faction cloned them and their memories, and started selling them to other allied nations and factions. Thus there are Franks everywhere you can find Pentapods and recent changes in the operations and aesthetics of Pentapod equipment are likely an effect of their widespread distribution.

No one knows what happened to the original Frank but some say they managed to escape their faction with the help of a group of humans and now wanders human space with them.

As near as anyone can tell, Frank was a mutant, something unexpected. How they slipped through Pentapod quality control is unknown but worlds are richer for it.

Animal	Hits	Speed
Stabiliser	14	0 m
Skills	Medic 2	
Attacks	—	
Traits	Large (+1)	
Behaviour	Omnivore, Eater	
Mass	500 kg	
Price	Lv10000	

SENSORS

The Pentapods have a variety of sensors, most of which are designed to track and categorise life forms. The sophistication of some of these sensors is near-magical to human observers, with some able to differentiate and categorise cerebral functions from a distance. All sensors resemble large, legless insects, with a bioluminescent screen to display information. Human-useable models are available for twice the price.

Basic

The basic life scanner has a range of 500 metres and can categorise animals on the basis of size and metabolism. It grants DM+2 to Electronics (sensors) checks for finding any sort of life form.

Item	TL	Kg	Cost
Basic Pentapod Life Sensor	N/A	2.5	Lv5000

Standard

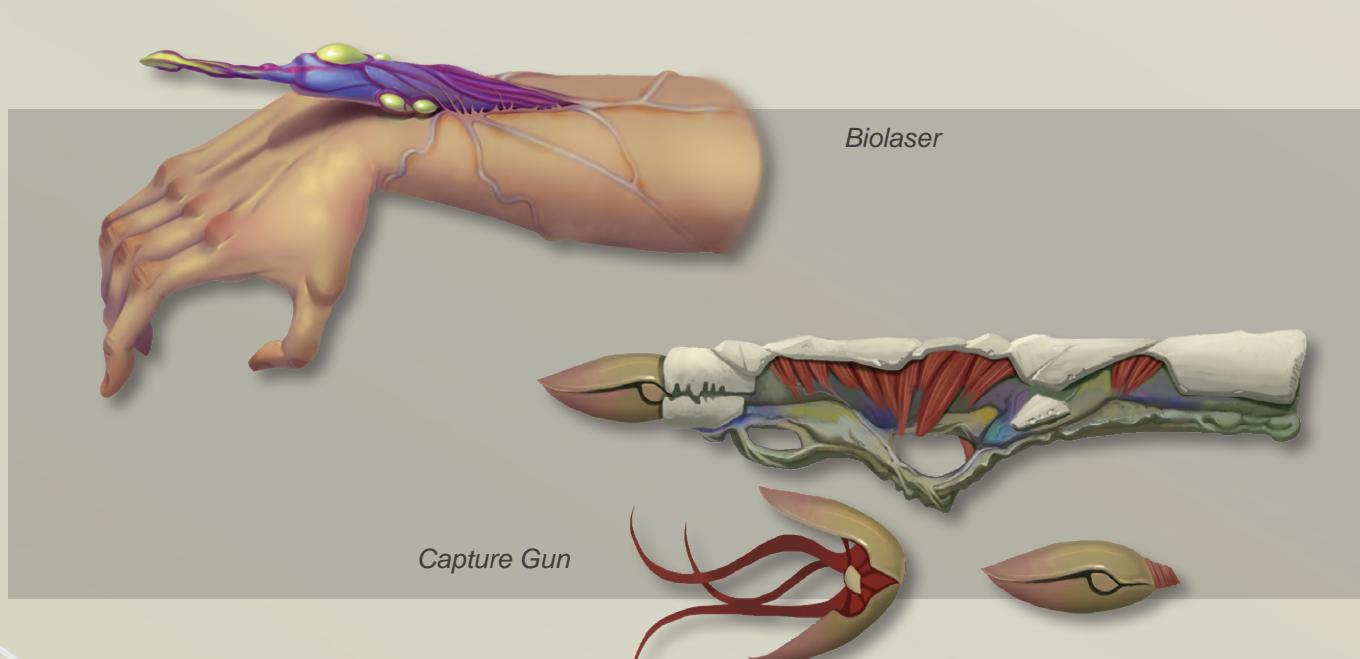
The standard life scanner has a range of 500 metres as well, can categorise life based not just on size and metabolism but also has the ability to perform rough categorisation based on the level of mental activity. It grants DM+4 to Electronics (sensors) checks for finding any sort of life form.

Item	TL	Kg	Cost
Standard Pentapod Life Sensor	N/A	7	Lv9000

Advanced

The advanced life scanner significantly improves on the mental activity sensing functions of the standard scanner. It can finely categorise mental activity and differentiate sapient life from non-sapient life. It otherwise has the capabilities of the standard scanner.

Item	TL	Kg	Cost
Advanced Pentapod Life Sensor	N/A	12	Lv22000



PENTAPOD WEAPONS

Pentapods produce a limited number of weapons, as Pentapod society normally does not require violence. Only a few have been made available commercially, of which only the capture gun is legal.

Biolaser

This purpose-built weapon can also be implanted into a Pentapod and is almost undetectable that way. Powered by an organic battery, the organic chemical laser has enough power for five shots before needing time to rest (about 20 minutes) during which time it also needs to be replenished with the chemicals the laser requires.

Some examples of this weapon have recently begun to turn up in human hands (literally) as implanted weapons. These variants are made of human biocompatible material and do not cause tissue rejection or infection. The biolaser connects itself to the host's nervous system and after an hour the host can begin using the weapon. It will show up on a scan of humans, unlike Pentapods.

Type:	20-01 biolaser
Country:	Pentapod
Length:	22 cm
Action:	Single shot
Ammunition:	N/A
Muzzle Velocity:	C
Magazine:	5 rounds
RoF:	60 rpm
Weight (Empty):	2.1 kg
Magazine Weight:	N/A
Price:	Lv3000

Capture Gun

The capture gun vaguely resembles a rocket launcher, although one made of gristle and sinew. It fires a large, egg-shaped construct that, before striking a target,

uncorks a couple of dozen, long thin tentacles, all coated with a slimy organic glue. Once the projectile strikes, it wraps the tentacles around the target and the glue sets within moments. The projectile then begins to scream. When killed, it relaxes its hold and an enzyme then has to be extracted from a gland on its back to release the glue.

The first time someone is exposed to a Pentapod capture gun, the screaming will be extremely unnerving, even somewhat debilitating. This causes DM-2 to all checks.

ENTANGLE: A Traveller hit by the capture gun must make a Very Difficult (12+) DEX check to avoid being entangled. The Effect on a failed check becomes the DM the Traveller suffers to all checks involving physical actions, as well as movement speed, until free. Escaping requires a Very Difficult (12+) STR check (other Travellers can help, working together as described on page 63 of the *Traveller Core Rulebook*). This can be attempted once a round but every subsequent attempt incurs a cumulative DM-2 to the check.

Type:	Organic Capture Device
Country:	Pentapod
Length:	90 cm
Action:	Single shot
Ammunition:	Capture Construct
Muzzle Velocity:	C
Magazine:	20 m/s
RoF:	30 rpm
Weight (Empty):	2.1 kg
Magazine Weight:	0.9 kg
Price:	Lv200

Weapon	TL	Range	Damage	Kg	Cost	Magazine	Magazine Cost	Traits
Biolaser	N/A	30	4D	2	Lv3000	5	N/A	Zero-G
Capture Gun	N/A	10	—	3	Lv200	1	Lv20	Entangle

BIOCOMPATIBLE REPLACEMENTS

The latest Pentapod innovation is still considered classified by the French government on Beta Canum but word of what they have accomplished has leaked out. It is possible that the new Pentapod enclave on Grendel may have, or may soon have, access to this achievement.

Pentapods on Beta Canum have managed to create human bio-compatible replacements, including organs, bones, eyes and limbs. The ethical questions raised have been numerous, in no small part because these replacements are, themselves, living creatures. Although the Pentapods have asserted that the creatures are not self-aware and in fact lack any sort of nervous system beyond what is intended to interface with the recipient, there have been few (although not none) volunteer recipients.

Another key question for bio-ethicists is how did the Pentapods come to create these functioning analogues of human organs and tissue? The Imperial French government considers trading human tissue or genetic material to the Pentapods to be a capital crime, on par with high treason.

Implantation of Pentapod organs is simple enough; the only difficult part of the process is draining the organ (or other tissue) of the support fluid used in lieu of blood and even then the organ handles most of it, squirting fluid out the largest of connecting arteries. It can then intake the host's blood and begin living on that.

These replacements appear to be identical to other limbs and organs, even taking on skin colouration and are operational within an hour or two of implantation. There are some differences, however. The organs do not appear subject to aging and tissue degradation, can self-heal and if removed the organ will close off all arterial and venous connections and survive for several hours on the blood it has retained. The organ can then be reimplanted in a different recipient. It would also be feasible to make the new limbs and organs improved, more efficient, stronger and tougher. There is no sign this has yet been tested.

The only item that has seen limited availability is a type of replacement blood. It lacks rH factors, platelets and white blood cells but is otherwise completely compatible with human biology, and transports oxygen in an identical manner. It has been made available for emergency use only at the central hospital in Premiere, the capital of the French colony on Beta Canum.

Item	TL	Kg	Cost
Arm, Hand, or Foot	N/A	3–5	N/A
Leg	N/A	15–18	N/A
Eyes	N/A	0.075	N/A
Minor Organ (Kidneys, Stomach)	N/A	0.15	N/A
Major Organ (Liver, Heart, Lungs)	N/A	1.0–2.5	N/A
Skin	N/A	4–6	N/A
Blood Replacement	N/A	1	Lv500

MEDICAL TECHNOLOGY

Medical technology at the beginning of the 24th century is very advanced compared to pre-Twilight times. In utero genetic therapies can identify and ameliorate most congenital disorders, cancer is curable by DNA modification of affected tissue, the common cold has been conquered and a number of diseases that have plagued humanity for eons have been eradicated, including polio, malaria, HIV/AIDS and a variety of parasitic and fungal infections.

Cybernetic/prosthetic replacements for limbs, eyes and several internal organs are possible, easy and effective. At the same time, organ and limb regeneration is a mature technology, although

it takes more time to regrow a limb than simply replace it with a prosthetic. On the Frontier, limb replacement via cybernetic or prosthetic is more common, due to the time involved in regrowth, the loss of productivity during that time and in many cases the lack of easy access to the technology.

The medical equipment and technology presented in this section are representative of the level of care and technology available in large centres on the Frontier. Coverage far from major centres is erratic, although since most autodocs can handle limb and organ transplants, cybernetics are the most common remedy for severe trauma.

MEDICAL EQUIPMENT

The medical technology of the 24th century is far advanced from the humble practices of the early 21st century. In general, any shock or trauma that does not immediately kill can be repaired. Even death is not final with resuscitation being possible for up to an hour past point of death, assuming access to TL12+ medical facilities or a static autodoc.

Medikits and Autodocs

Often the first, and in some cases only, medical attention an injured or ill Traveller might receive is from a medkit or its more advanced cousin, the autodoc.

First Aid Kit

A first aid kit is a simple supply of basic emergency supplies. It includes no drugs other than mild painkillers and antiseptic wipes. It provides the supplies for basic first aid and removes the penalty for not having the proper equipment. It provides no bonus to Medic checks or healing time.

Item	TL	Kg	Cost
First Aid Kit	9	1	Lv80

Gauntlet Autodoc

Often found in a gauntlet-style arm computer or similar device, this autodoc can diagnose and treat wounds and disease as if it had Medic 0. It can remove bullets, close wounds, set broken bones and dispense a basic array of medicines. It has all the capabilities of a medkit but does not require the Medic skill to use, just the ability to follow instructions and hold still. Like the medkit, use of the gauntlet halves healing times. It even has micro-manipulators that can cut, stitch and glue tissue. When used by someone with the Medic skill, the autodoc adds DM+1 to non-diagnostic Medic checks.

Item	TL	Kg	Cost
Gauntlet Autodoc	12	3	Lv1000

Medkit

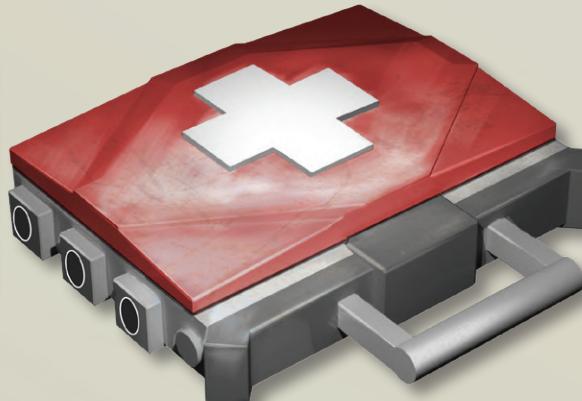
The medkit is a portable paramedic kit containing limited diagnostic equipment, spray-on bandages and autoinjectors of antishock, antitoxin, antivenin, antibiotic, stimulant and anaesthetic drugs. Other types of drugs would have to be purchased separately. Given sufficient skill, the medkit contains equipment needed to diagnose and treat minor injuries, and stabilise serious conditions. A medkit contains enough materials for 20 uses. Use of a medkit reduces normal healing times by half when used by someone with Medic 1+.

Item	TL	Kg	Cost
Medkit	9	1	Lv800

Gauntlet Autodoc



Medkit



Medkit Resupply Package

A medkit resupply package is used to replace medkit materials that have been consumed. Each resupply package replaces five uses worth of materials.

Item	TL	Kg	Cost
Medkit Resupply Package	9	0.2	Lv100

Lightweight Autodoc

Portable and inexpensive, the lightweight autodoc is popular with emergency teams and often used in large numbers during disaster relief. It is intended only for temporary care. The medical supplies carried in a lightweight autodoc can maintain a patient for an average of 24 hours before resupply is necessary. The batteries run for approximately 10 hours of operation and can be recharged wherever normal electrical power of at least Light capacity is available. Its medical supplies can be resupplied at any medical facility containing static autodocs. Use of a lightweight autodoc quarters all healing rates

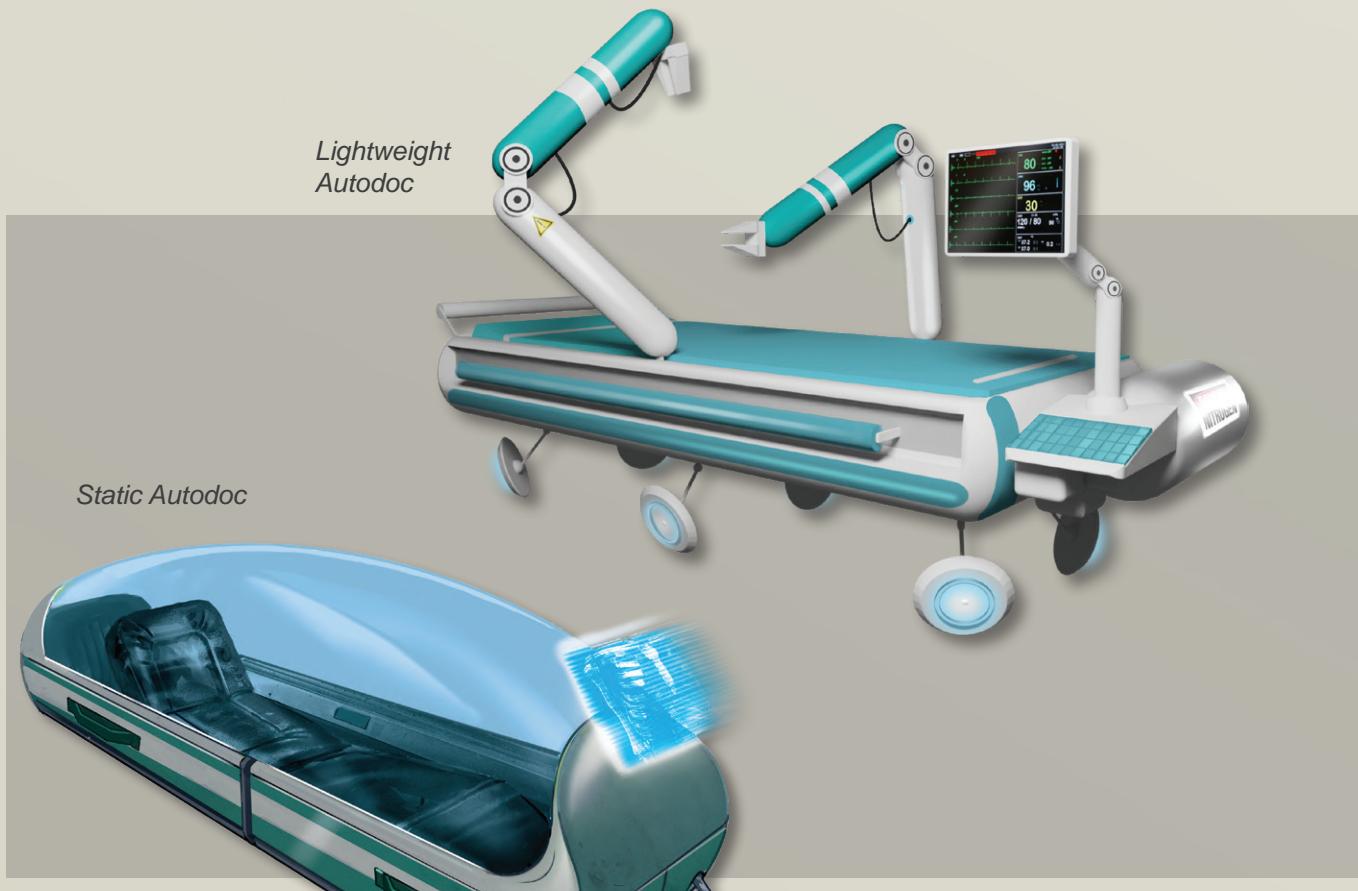
and adds DM+1 to all Medic checks. In the absence of a qualified human operator, the autodoc operates with Medic 1.

Item	TL	Kg	Cost
Lightweight Autodoc	11	100	Lv6000

Static Autodoc

The static autodoc is designed for permanent emplacement in a hospital ward or on a starship. With the static autodoc, a patient's condition can be accurately diagnosed and treated over a long period of time. This equipment is designed to run off local power but in the event of a power outage, it has 12 hours' worth of emergency battery power. Use of a static autodoc boosts all healing rates by six times normal and adds DM+2 to all Medic checks. In the absence of a qualified human operator, the autodoc operates with Medic 2.

Item	TL	Kg	Cost
Static Autodoc	12	1,000	Lv25000



MEDICAL IMAGING EQUIPMENT

There are a variety of imaging technologies available in the 24th century, from portable ultrasound imagers, to Quantum Resonance Imaging, to imaging dust and microdrones. Due to component miniaturisation, medical imagers are defined more by size and capability than technology used.

Gauntlet Imager

Gauntlet imagers are used alongside gauntlet autodocs, especially in the field. Using it requires the hand of the gauntlet, where the imager is located, be moved all around the affected area to build up a 3D image, which is then displayed on a HUD or holographic display. Gauntlet imagers grant DM+1 to diagnostic Medic checks.

Item	TL	Kg	Cost
Gauntlet Imager	12	4	Lv2000

Genetic Imager

Sometimes called a forensics imager, the prototype genetic imager can use a DNA sample to build an image of what a person, or even alien, might look like. The 'might' is important, as there is a certain amount of artistic licence in the image produced. Factors like hair length, facial hair, body mass and fat levels are all assumed as typical. When dealing with DNA remnants from earlier or vanished cultures, there is considerably more margin for error. Even sequencing the genome can lead to chaotic errors without a reference.

That said, the genetic imager is a recent and welcome addition to medicine, science and security services. Constructing an image from DNA using a genetic sample requires a Very Difficult (12+) Medic or Science (biology or xenobiology) check (1D days, EDU).

Item	TL	Kg	Cost
Genetic Imager	13	500	Lv120000

Imaging Dust

This consists of dust-mote sized cameras and lighting modules. It is normally used to inspect hard-to-reach places but in medicine also to obtain images of the interior of lungs, sinuses and the gastro-intestinal

tract. Medical imaging dust is incapable of independent movement and the cameras and lights themselves are very short-ranged, up to perhaps five centimetres. Imaging dust is designed to break down after use and then be flushed out by bodily processes.

Item	TL	Kg	Cost
Imaging Dust	12	—	Lv1000

Portable Imager

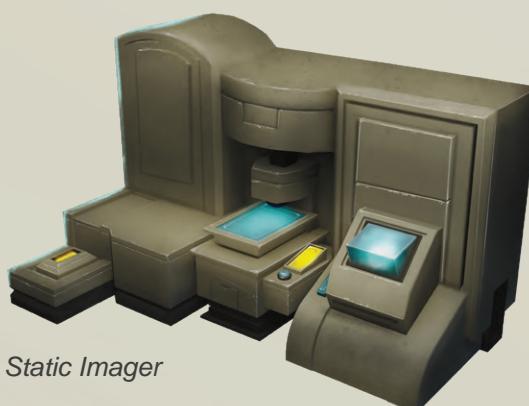
Portable imagers are usually found in field hospitals or well-protected vehicles. They deliver a much higher resolution image of the patient than a gauntlet imager but require the patient to be completely enclosed. Unlike the gauntlet imager, they are able to do full body scans. Portable imagers grant DM+2 to diagnostic Medic checks.

Item	TL	Kg	Cost
Portable Imager	11	160	Lv12000

Static Imager

The static imager is a massive piece of equipment found only in better-equipped hospitals and some starships. The rooms housing these machines have to be carefully shielded to protect surrounding electronics from the effects of the scanner. It can provide extremely high-resolution images, capable of zooming in and resolving fine detail at the cellular level. It grants DM+4 for diagnostic Medic checks.

Item	TL	Kg	Cost
Static Imager	12	8500	Lv120000



Static Imager

MOBILE SURGERIES

A mobile surgery is a semi-portable surgical suite that can be housed in a small trailer or cargo container. It requires a power source of Medium or higher capacity, with a clean water supply and waste drainage. The bay does have its own water tank and waste storage tank but they are limited in capacity.

Portable surgeries like this are often found in refugee camps, survey camps and new colonies. The other significant use, although not advertised, is a mobile black clinic. The systems in the medbay are equipped to deal with just about any sort of surgery or medical emergency.

Mobile Medbay

The medbed is at the centre of the mobile medbay, serving as the operating table and including the equivalent of a portable imaging system (see page 110). The bed provides a microsurgery array with fine-control waldos, allowing a skilled surgeon to attach even the thinnest of nerve fibres together, in addition to other automation common in medicine. The module includes an expert diagnosis system, which grants DM+3 to any Medic or Science (biology) check to

identify a disease, parasite or other organism, and suggest a treatment. The mobile medbay does not include recovery facilities.

The surgical suite itself grants DM+3 to all Medic checks involving surgery. Unlike an automed, however, it requires a human to operate it.

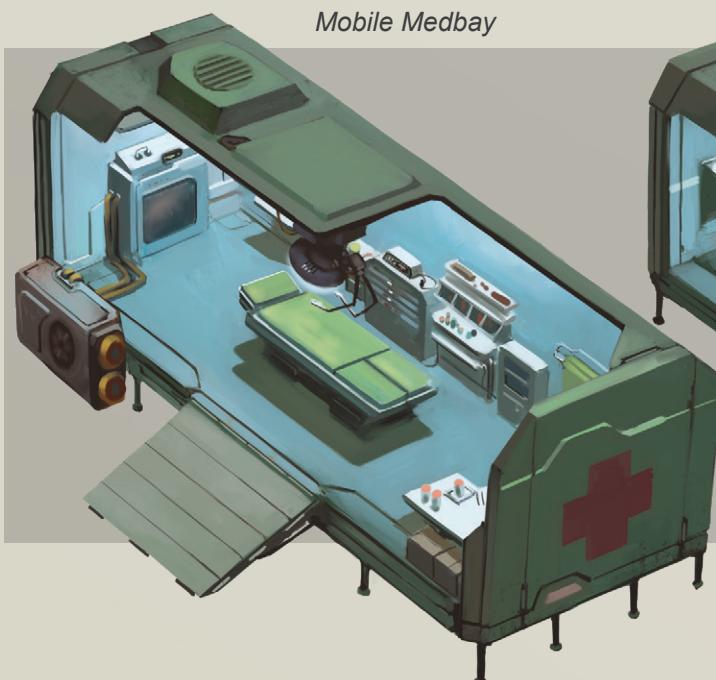
Item	TL	Kg	Spaces	Cost
Mobile Medbay	12	6,000	24	MLv3

Mobile Recovery Ward

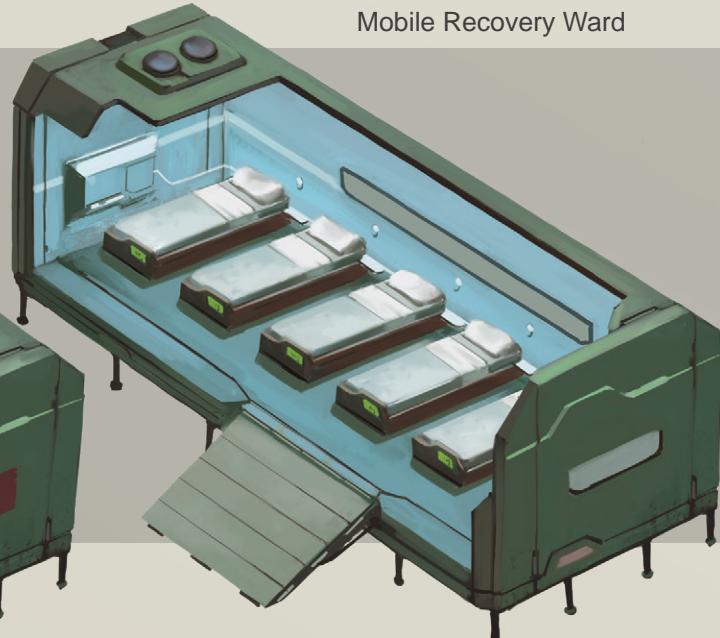
Contained in a trailer or container the same size as the mobile medbay, the mobile recovery ward can hold up to six adult-sized patients and includes comfortable beds and full life support for each. The electronics and medical equipment in each bed has the same support capability as a portable automed. Use of a recovery ward reduces healing times by 75%.

Item	TL	Kg	Spaces	Cost
Mobile Recovery Ward	12	6,000	24	MLv2

Mobile Medbay



Mobile Recovery Ward



DRUGS

DRUGS

Commercial pharmaceuticals are created to not just treat illness but also improve personal performance.

Antibiotics

Much like anti-viral drugs, anti-biotics are available in either wide-spectrum or targeted formulations. Due to the ability of many microbial lifeforms to develop resistance over time, the powerful wide-spectrum varieties are only used when either the infection is novel or unknown. Targeted formulations are preferred when available.

TARGETED ANTIBIOTIC

Targeted anti-biotics are very effective against the infection they are designed for but of little help otherwise. They grant DM+3 to Medic checks to treat the disease and DM+1 versus any other. At the Referee's discretion, one disease could be close enough to another to be affected by a targeted antibiotic.

Item	TL	Kg	Cost
Targeted Antibiotic	10	—	Lv30

DIGITS

While powerful and effective, wide-spectrum antibiotics attack all microbes in a body, including gut microflora that is essential for digestion, along with any symbiotes. This increases the likelihood that one or more microbes may develop a resistance to the drug. It also means that healthy gut microflora and symbiotes need to be re-established. While that is a straight-forward matter for symbiotes, it is somewhat more complicated, and disgusting, for gut microflora. Many well-equipped hospitals will maintain a gut microflora culture against the possibility. For others without the culture, the only good option is a faecal transplant. Without replacement of the gut microflora, digestion will be incomplete, which will

cause pain, discomfort and inflict DM-2 to all checks from a combination of discomfort and exhaustion due to malnutrition.

Wide-spectrum antibiotics grant DM+2 to any Medic check made to treat an illness.

Item	TL	Kg	Cost
Wide-Spectrum Antibiotic	10	—	Lv60

Anti-Virals

Anti-virals are a class of drug designed to target viruses and mark them for the host's immune system to dispose of. They are extremely valuable on the Frontier, where novel viruses appear constantly, even on worlds with incompatible biospheres.

WIDE-SPECTRUM ANTI-VIRAL

Wide-spectrum anti-virals offer a 'scatter-shot' approach when the virus is unknown and has not been sequenced. These drugs grant DM+1 to Medic checks to treat viral diseases.

Item	TL	Kg	Cost
Wide-Spectrum Anti-Viral	11	—	Lv500

TARGETED ANTI-VIRAL

Targeted anti-virals are used to treat specific viral diseases, where the virus in question has been isolated and sequenced. The drugs grant DM+2 to Medic checks to treat a specific viral disease. They have no effect against any other virus. At the Referee's discretion, one disease could be close enough to another to be affected by a targeted anti-viral.

Item	TL	Kg	Cost
Targeted Anti-Viral	10	—	Lv150

INTERFERON-GAMMA

Interferon is a potent broad-spectrum anti-viral drug. In addition to combating viral diseases, it has other uses. If administered within 24 hours of infection

by a DNAM retrovirus, Interferon-Gamma can stop it before any significant alterations happen. If administered after this time period, the interrupted process may give rise to cancers and teratomas. Interferon-Gamma grants DM+2 to Medic checks to treat viral infections

Item	TL	Kg	Cost
Interferon-Gamma	11	—	Lv2000

Performance Enhancers

Performance enhancers often fall into the category of illegal, or at least controlled, drugs. They often have a therapeutic benefit but can be abused.

BOOST

Boost was initially developed as a combat drug during the Central Asian War but has increasingly found its way onto colony worlds, especially those with dangerous fauna. A single dose of Boost will last for six hours and give the user the benefits of the Fast Metabolism (+1) trait (see page 85 of the *Traveller Core Rulebook*) A double dose will give the user the Fast Metabolism (+2) trait and extend duration by two hours. A triple dose does not increase Initiative checks but will extend the duration by another hour, for a total of nine. Subsequent doses within a 24-hour period will have no further effect but still require a Routine (6+) END check to resist the side effects. Failure will result in a DEX loss equal to the Effect, for a period of 24 hours while the patient undergoes violent convulsions as every neuron in their motor nervous system misfires.

Item	TL	Kg	Cost
Boost	11	—	Lv100

BOUNCE

Bounce is a drug used primarily by people operating in zero-G environments. Its effect is to counteract the reduction of co-ordination experienced by those operating in a lower gravity than that of their native world. A Traveller using Bounce treats gravity as if it were one level higher; Zero-G is treated as if it were Low-G, Low-G as if it were normal and normal as if it were High-G. The effects of each dose last an average of 10 hours. Multiple doses of Bounce can be taken in a 24-hour period to further counteract the effects of gravity upon DEX or extend the drug's duration but side effects are not uncommon in such

cases. Note that Bounce can only be used to negate penalties, not add bonuses. The most common side effect is short-term paralysis, lasting until the drug wears off. Bounce is only available at major starports, although many starships also carry doses for passengers.

When taking more than one dose of Bounce in a 24-hour period, a Traveller must make a Routine (6+) END check. Failure will result in limb paralysis for 3D hours. For every additional dose taken in any 24-hour period, apply a cumulative DM-2.

Item	TL	Kg	Cost
Bounce	11	—	Lv40

BREEZE

Originally developed as a party drug in the Core, Breeze's ability to allow young partiers to dance for three days straight was noticed by corporate interests, who refined the drug and distributed it to workers in mining colonies and outposts. It is highly illegal, due to the possibility of a psychotic breakdown. Breeze gives the user the Tough/2 trait (see page 100 of *The Worlds of 2300AD*) and a single dose of the party drug lasts for 24 hours. A single dose of the corporate version lasts for three days. Every time additional doses are consumed within a 24-hour period, the user must make a Routine (6+) END check, with DM-2 per additional dose taken. If the check is failed, EDU is reduced by the Effect.

Item	TL	Kg	Cost
Breeze	12	—	Lv50

This is a drug developed in a memory-enhancement study by members of the Foundation for Practical Knowledge. The drug works very well as a temporary memory enhancer (adding +4 to INT and EDU) but the effect does not last long (2D hours).

There is an alternative use in security circles as the drug has a useful side-effect – extreme talkativeness. The user becomes so caught up in the clarity of their memory that they do not realise they are talking aloud. For those using J solely to combat memory loss this is an annoyance but it works wonderfully in interrogations. When asked a direct question, a J user must make a Very Difficult (12+) END check to avoid answering

truthfully and completely. The only problem interrogators have is to sort important facts from the vast volume of unassociated information.

Item	TL	Kg	Cost
J	10	—	Lv30

HERC

Herc is a drug made popular by physical labourers and has also been used on occasion by ground military forces. Each dose of the drug increases STR by +2 for a period of approximately seven hours (2D for duration), after which time the user must rest for an equivalent period of time. If the rest period is ignored, or if multiple doses of the drug are taken in a 24-hour period, painful muscle spasms are likely.

If the rest period is not followed, or multiple doses are taken, then an Average (8+) END check is required. If the check is failed with Effect -5 or worse, the user will suffer STR -2. This will last for 1D days.

Item	TL	Kg	Cost
Herc	11	—	Lv30

VASOPRESSIN-Y

This drug allows the human brain to modify its electrical pathways, making it easier to learn new topics and recall things learned. Due to its addictive effect, this drug is usually used by those beginning major projects who can quit after the project's completion. While common in the Core, this drug is comparatively rare on the Frontier and price can be five to ten times higher.

The drug must be taken as a daily dose for two full weeks for any effect. After that, the Traveller's INT will increase by +D3.

If the Traveller remains on the drug for one month or less, they suffer no side effects. For every month thereafter, they will lose END -1, regained at the rate of one point per week after no more Vasopressin-Y has been taken. If a Traveller's END reaches 0, they slip into a catatonic state. To quit taking Vasopressin-Y, the Traveller must make a Difficult (10+) END check. This can be retried once per week.

Item	TL	Kg	Cost
Vasopressin-Y	11	—	Lv50 per week

Metabolic Drugs

Metabolics act to increase or decrease a patient's metabolism, either to slow progress of an illness or infection until the subject can reach effective medical care, or else radically increase a patient's healing rate. Both put the patient into a sort of fugue while the drugs do their work, so the patient is not aware of the passage of time.

AUGMENTER

Metabolic augmenters greatly increase base metabolism. This requires intravenous feeding and constant medical attention. The most common type available is DeLamb et Frere's MetaBolX Omega, which increases the metabolic rate by a ratio of 10 to 1. For every day of real time, the patient experiences 10 days, allowing rapid healing from injuries and surgeries. Note that augmenter cannot be used for the rapid regrowth of limbs or organs, as that process is already accelerated. Further acceleration results in a combination of runaway cancerous and teratomous tissue.

Item	TL	Kg	Cost
Augmenter	10	—	Lv750

INHIBITOR

These slow the subject's metabolism to the point where sophisticated diagnostic equipment is needed to detect any sign of life. It is often used as a 'poor person's hibernation', and the most popular variant (DeLambe et Frere's MetaBolX Alpha) slows the passage of time by a ratio of 10 to 1; so for every day experienced by the patient, 10 days pass in real time. The maximum amount of time the drug can be used for is 20 days of real time, after which the subject suffers one point of damage per day. Once the first characteristic is reduced to 0, the patient sinks into a coma, requiring professional medical intervention to recover. Without medical care, the subject will deteriorate at the rate of two points of damage per day until death. Medical care can arrest this decline and start the patient on the road to recovery.

Inhibitors can be used for the transportation of animals or people over short planetary or interstellar distances, both to increase the number of passengers carried and reduce life support costs. Use of an inhibitor on human subjects for this purpose is often illegal.

Item	TL	Kg	Cost
Inhibitor	10	—	Lv1000

Painkillers

Painkillers are a class of drugs that numb, dull or even eliminate the sensation of pain. Painkillers are easily-abused and save for expensive Ultrax medications, can lead to addiction, while overdoses can lead to death.

LIGHT PAINKILLERS

Related to older drugs like acetaminophen or ibuprofen, light painkillers are sufficient for treatment of minor pain, including some categories of headaches and minor muscle and joint pain. These new drugs do not lead to addiction or death but exceeding the daily recommended intake can make the user very ill. Light painkillers can eliminate up to a DM-1 penalty from exhaustion, injury or illness.

Item	TL	Kg	Cost
Light Painkiller	8	—	Lv1

MODERATE PAINKILLER

Unlike light painkillers, these can be dangerous if an overdose is taken but they seldom lead to addiction. Moderate painkillers are used after minor surgery and for moderate pain from injuries or severe illness. These painkillers can eliminate up to a DM-2 penalty from to exhaustion, injury or illness.

Item	TL	Kg	Cost
Moderate Painkiller	8	—	Lv5

HEAVY PAINKILLERS

Very similar to naturally-occurring opioids, heavy painkillers, while the most effective, are also the most prone to abuse and addiction. Even with improvements engineered over decades, their very effectiveness is why they are so often abused. There is a lucrative black market in drugs like this and so they are heavily controlled in nations and colonies of Law Level 5+.

Avoiding addition requires a Difficult (10+) END check, with DM-1 for every week they are regularly used. These painkillers can eliminate up to a DM-4 penalty from exhaustion, injury or illness.

Item	TL	Kg	Cost
Heavy Painkiller	8	—	Lv20

DELAMBE FRERE ULTRAX PANIKILLERS

Ultrax painkillers are tailored to each individual, reacting precisely with their brain chemistry to eliminate pain with as few side-effects as possible. It is not possible to overdose on Ultrax, nor can a person become addicted to it. This medication is very expensive, however, and few nations, colonies or even TransNats, are willing to provide it under their health care plans. Ultrax requires a licensed DeLambe Frere autodoc to test the patient and provide a baseline profile.

These painkillers can eliminate up to a DM-4 penalty from exhaustion, injury or illness.

Item	TL	Kg	Cost
Ultrax Painkiller	13	—	Lv2000

Vaccines

With so many different colony worlds within human space, disease is a constant threat. Advances in vaccine technology, including improvements in identifying and sequencing new life forms, have kept humanity ahead of the curve – at least most of the time. The Wasting Plague on Nous Voila, Miner's Rot on Crater, Ice Lung on Dukou and dozens of other diseases have popped up across the Frontier, and only herculean efforts have prevented them from spreading.

Most use a variation on mRNA vaccines, a technology that allows vaccines to be rapidly developed. Once a contagion is identified, then sequenced, applicable genetic markers are then loaded into the mRNA delivery mechanism. The resultant vaccine then programs the body's immune system to respond to the contagion. Since the delivery system is already developed, vaccines can be created and deployed very quickly.

While the delivery mechanism is relatively inexpensive, the cost of isolating and sequencing the pathogen can be time-consuming and expensive. Isolating, Sequencing and Payload Creation, are steps in a task chain. Each usually requires a Difficult (10+) Medic or Science (biology) check, whichever the Referee decides is more appropriate. Time scale at each step is usually 3D days. The final payload cost is Lv1000 x time (in days) for all steps combined.

Item	TL	Kg	Cost
mRNA Vaccine	10	—	Lv20

Other Pharmaceuticals

There are a variety of drugs that fall into other categories.

ANTI-VENOM

It is difficult to create broad-spectrum anti-venom treatment, as there are so many different mechanisms used in thousands of different types of venom from creatures scattered across 33 different worlds. The most effective broad-spectrum anti-venom treatment only works when injected at the site of the envenomation, destroying a broad class of enzymatic proteins, including about 75% of venom encountered. It is ineffective against venom from biological incompatible lifeforms, such as on Aurore or Beta Canum.

Otherwise targeted anti-venoms developed for specific worlds are more effective against those types but ineffective off-world. Broad-spectrum anti-venom provides DM+1 to resist the effects of venom, while targeted anti-venom provides DM +2 against local planetary venom but are useless against venoms from other worlds.

Item	TL	Kg	Cost
Broad-spectrum Anti-venom	11	—	Lv100
Targeted Anti-venom	10	—	Lv20

PLANETARY ADAPTION REGIMEN

The Planetary Adaption Regimen is a cocktail of drugs and antihistamines tailored for a particular planet. It provides DM+2 to checks made to combat PAS. Any autodoc on a planet will be programmed with the proper drug mixtures and the autodoc's expert system can easily tailor required dosages to suit any individual.

DNA-modified colonists returning to Earth or Tirane require the Regimen, as they would in turn suffer PAS on Core worlds.

Item	TL	Kg	Cost
Planetary Adaption Regimen	10	—	Lv50

PHIADRENALINE-19

This drug is used as a targeted treatment for anaphylaxis and similar severe allergic reactions, with minimal side-effects. As an adrenaline-analogue, it causes mild shakes and tremors, and can make the heart race (DEX -1 and END -1) but the effects wear off after about 20 minutes. Phiadrenaline grants DM+4 to END checks made to resist severe allergy attacks and anaphylactic shock.

Phiadrenaline-19 is typically sold in single-dose dispensers. These dispensers use a compressed-air injector that does not require a needle, although it needs skin contact.

Item	TL	Kg	Cost
Phiadrenaline-19 Dispenser	10	—	Lv200

RADOX

This drug can mitigate the effects of radiation exposure, at least to some extent, if administered within five minutes of exposure. Radox has the effect of reducing the radiation dose by -200 rads. It cannot be used to remove accumulated radiation exposure, only acute exposure.

Item	TL	Kg	Cost
Radox Injector	12	—	Lv400

SYMBIOTES

Through the use of symbiotic organisms, further advances far beyond other medicine technologies are possible.

ATMOSPHERE FILTRATION SYMBIOTE

The Atmosphere Filtration (AF) symbiote was first developed for the colonists of King, to filter out sulphur in the planet's atmosphere. It is a microscopic organism that takes residence in the lungs and filters selected contaminants, using them for food. AF symbiotes have now been developed for use on several worlds with atmospheric taints. While in a contaminated atmosphere, the AF symbiote will continue to reproduce. After the symbiote dies, it and its load of contaminants are cleared from the lungs by a few coughs.

One dose is sufficient to establish the symbiote colony and it will survive as long as the host is breathing the proper atmosphere. The AFS provides DM+4 to END checks to resist the effects of a tainted atmosphere.

Item	TL	Kg	Cost
Atmosphere Filtration Symbiote	10	—	Lv250

CALCIUM FIXER

The calcium fixer is a single-celled organism introduced into the blood stream for long-duration space travel. It captures calcium dissolved in the blood stream and affixes it to bones. This symbiote is usually destroyed once the user arrives in a more stable gravity, to avoid side-effects like bone spurs and blood chemistry-related problems.

Item	TL	Kg	Cost
Calcium Fixer	10	—	Lv100

DETOK

Detox is a symbiote that exists in a variety of tailored forms, each designed to counteract a specific drug or toxin. Within two hours of being administered, all effects of the drug or toxin are gone. The symbiote lasts in the user's system for up to 2 weeks (2D+2 days) and delivers immunity to the specific drug or toxin for that time period. Detox cannot counter biological agents.

Item	TL	Kg	Cost
Detox	11	—	Lv500

ORAL HYGIENE

The Oral Hygiene Symbiote (OHS) is an amoeba-like engineered creature designed to live in the human mouth. When working properly, it scrubs teeth clean of bacteria and plaque and suppresses the bacteria that cause bad breath. It is often used in outposts and by Belters, in close and water-poor conditions where oral hygiene can be difficult but is very necessary.

If the Traveller's diet has too much sugar in it, sometimes the OHS will malfunction and begin to multiply out of control. The breath quickly becomes intensely foul and the mix of the symbiote and saliva may make the Traveller appear to be foaming at the mouth. While the OHS malfunction is not dangerous, it is embarrassing. Nonetheless, OHS is still very popular.

Item	TL	Kg	Cost
OHS	11	—	Lv50

SKIN HYGIENE

Similar in concept if not execution to the OHS, the Skin Hygiene Symbiote (SHS) takes advantage of microscopic creatures that already inhabit the outer layer of human skin. Skin mites can be found on almost every human being across human space. Some live in eyelashes, others at the base of hair follicles, but they are omnipresent. The SHS essentially reprograms skin mites to clean the skin. Since normal skin mites serve an important purpose, SHS uses an engineered variety that cannot reproduce and die off quickly. Common practice is to use an SHS impregnated wipe to quickly wipe across the body, then go to bed. The mites will do their work at night and be dead by morning. SHS removes excess oils, sweat and dead skin, and suppress the bacteria that cause body odour.

Despite its utility, SHS is not popular and it is likely production will be suspended.

Item	TL	Kg	Cost
SHS	11	—	Lv20

REGROWTH AND CLONING

LIMB AND ORGAN REGROWTH

Using pluripotent stem cells harvested from the patient, limbs and organs can be regrown. The common practice is to force-grow limbs or organs in accelerated incubators and then graft or implant them onto (or into) the patient. Less commonly, organ and limbs can be regrown in place using a regeneration collar. Daily visits and adjustments by a doctor are required to ensure the success of the in-place procedure. This doubles the cost and halves the time required to replace the affected body part. In most cases, it is quicker and easier to implant a cybernetic replacement instead. Well-equipped ships and outposts may have regeneration equipment available but it is relatively rare on the Frontier. Cybernetics are quicker to install and more flexible, as tools and equipment can be mounted on a cybernetic limb, and cybernetic organs can confer augmentations to the Traveller using them.

Item	TL	Kg	Cost
Regeneration Collar	11	4	Lv4000
Regeneration Tank	11	150	Lv15000

Regrowth takes time and costs money, independent of the cost of the regeneration equipment. This covers the cost of nutrients, stem cell collection and monitoring of the growth.

The process requires a Routine (6+) Medic check, (1D x time increment, EDU) on the part of the attending physician or expert system. Apply DM+2 for vat-grown tissue, DM-2 for a limb or major organ and DM-4 for a critical organ.

The forced-growth techniques that allow limbs and organs to be regrown have a risk for producing cancers and teratomas, in a similar manner to DNA modification therapy. Side-effects are determined by the Effect on failure. An Effect of -1 results in a minor teratoma, -2 to -5 in multiple teratomas and -6 or worse in vigorous cancer, resulting in the failure of the limb or organ.

FULL-BODY CLONING

The full-body cloning of a human is possible. However, the forced-growth techniques used for limbs and organs do not translate well to a full body and tend to give rise to differential growth rates in various areas, producing a misshapen monstrosity. Cancers and teratomas are also very common, leaving a full-body forced-growth clone a poor candidate for donating organs and other body parts.

Creating a full-body clone with forced-growth techniques requires monitoring in a medical facility and a larger incubator to bring the clone to the correct age.

Item	TL	Kg	Cost
Full Body Regeneration Tank	12	2,000	Lv500000

Creating a mature full-body clone requires a Very Difficult (12+) Medic check (1D x 100 days, EDU). There DM+2 is applied for a major Frontier medical facility, DM+4 for a major Core medical facility.

Regeneration Item	Cost
Full Body Clone	Lv100000

Regeneration Item	Time Increment	Cost	Example
Minor Body Part	10 days	Lv2000	Finger
Limbs or Major Organs	20 days	Lv10000	Arm, leg, kidney, eye
Critical Organ	40 days	Lv30000	Pancreas, heart, liver

FRONTIER CYBERNETICS

On the Frontier, cybernetic replacements are most often used as a 'quick and dirty' solution to traumatic injury, eliminating the cost and time of regeneration therapy or force-growing a cloned replacement part. While that is still the most effective solution for organ trauma, for items like limbs, eyes and ears, simple cybernetic replacement is easiest, with the patient regaining their feet in a matter of days.

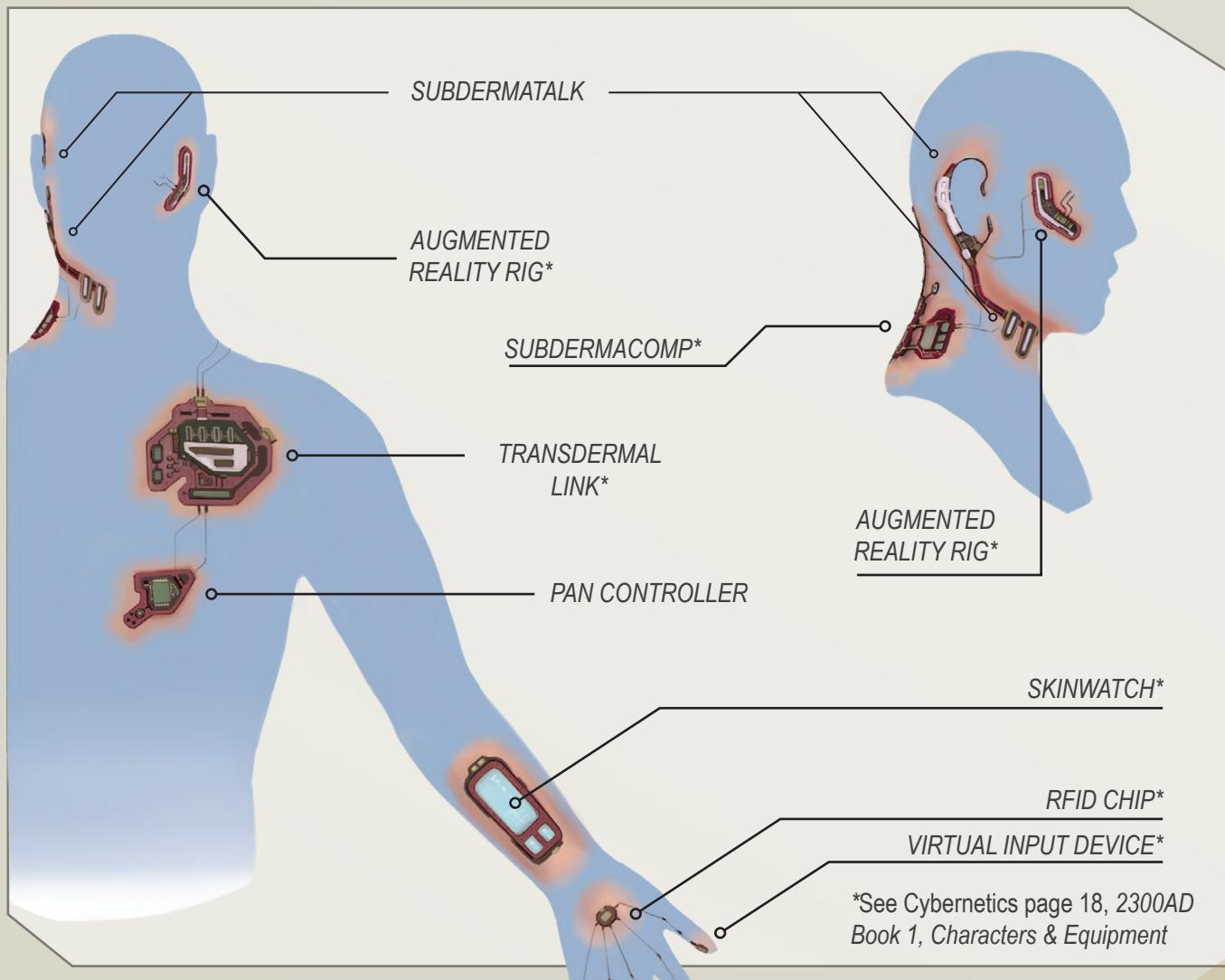
The cybernetic replacements and augmentations included here are representative of cybernetics more commonly available on the Frontier. More esoteric modifications require a visit to one of the few major urban centres on the Frontier, like Première on Beta Canum, Ingolstadt on Nibelungen or Liberty on Ellis. Otherwise, the Core is the only option. Other

augmentations are available but generally only from Core clinics (see pages 17–27 of *2300AD Characters and Equipment*).

In most cases, installation of the cybernetic implants here should be automatic, unless they are done under stress in the field.

Subdermals

Subdermal implants do not go as far as full cybernetic implants; they consist of several types of equipment implanted in the body but do not require mind-machine interfaces. Their control is more basic, typically by



wiring controls into hands and displays to the optic nerve. To activate the devices usually requires a set of hand motions unlikely to be performed by accident. After that, the motions of the fingers control the equipment as if it were being held. This interface technology is called a 'virtual input device'.

GROWLER

The growler is a specialised implant used for communication with the Ebers and allows a Traveller to duplicate the low notes used in parts of Eber speech. The work for this subdermal was pioneered on Kormoran in the Texas Enclave there.

Augmentation	TL	Cost	Surgery Time
Growler	10	Lv1500	30 minutes

PAN CONTROLLER

The Personal Area Network is a very short-range networking protocol that uses either encrypted low power radio or signals transmitted across the surface of the skin. All PANs require a controller, a small device implanted just below the skin. An external PAN controller fastened by an adhesive is also an option.

Augmentation	TL	Cost	Surgery Time
PAN Controller	10	Lv500	10 minutes
External PAN Controller	11	Lv300	—

SUBDERMATALK

The simplest of true subdermals, the subdermatalk consists of a small 15 kilometres range radio implanted behind the ear, with a microphone placed alongside the larynx. It is not necessary to talk out loud to use the system – sub-vocalising is enough.

Augmentation	TL	Cost	Surgery Time
Subdermatalk	10	Lv500	20 minutes

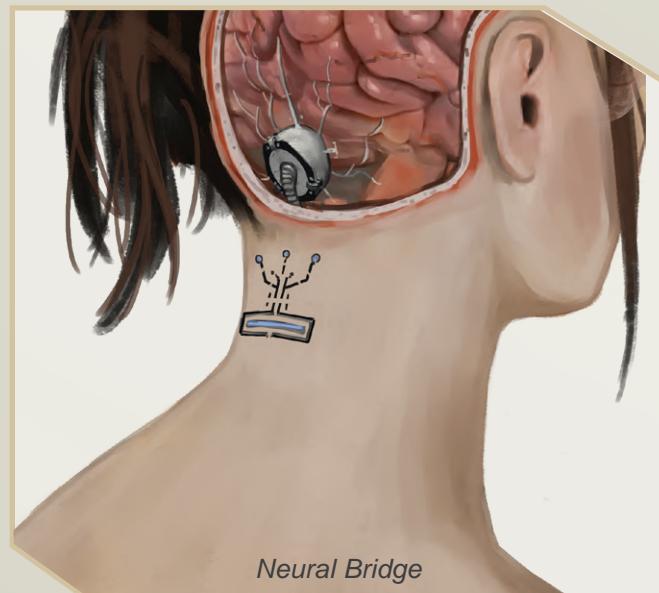
Human-Machine Implants

One of the results of increased knowledge of nerve cells has been the development of technology by which human nerves can be linked to electronic devices. In this way, the biochemical process of thought can be translated into action by machine. This technology is most valuable in allowing the control of prosthetic limbs and cybernetic replacements such as eyes and ears but can be extended through a neural interface to allow control of external devices, including vehicles and weapons.

NEURAL BRIDGE

The same technology behind a neural link can create a direct interface between an implanted subdermalcomp and the brain. This can be utilised with a neural jack but that is not required.

Augmentation	TL	Cost	Surgery Time
Neural Bridge	12	Lv15000	40 minutes



NEURAL JACK

When it first appeared in the late 2280s, the neural jack was hailed as the ultimate tool in ridding humanity of the constraints of the body. It is an electronic socket wired to the brain through a neural bridge. This allows the Traveller to plug cable connections into equipment in order to control it by thought as if it were the Traveller's own body.

When jacked into a piece of equipment, a Traveller's control of it will be both quicker and more accurate than if using manual controls. A jacked Traveller receives DM+2 to any checks involving the use of the equipment and, in the case of vehicles and ships, DM+1 to Initiative rolls. If a Traveller is jacked into a vehicle or starship, they become almost insensible to the control of their own body; the ship or vehicle effectively becomes their body. Any checks requiring the Traveller to use their own body while jacked into a ship or vehicle suffer DM-4.

Most military and civilian equipment at TL11 and higher may (3+ on a roll of 1D) have neural interface capability. TL12 items always have a neural link, if appropriate.

At time of installation, the Traveller must decide where the jack will be located on their body, the most common being on the temple or forehead (for ease of access) or at the nape of the neck (where it can be hidden by hair or clothing). Another common choice, especially for military operators, is the wrist, allowing for quick and easy connection to hand-held weapons.

Augmentation	TL	Cost	Surgery Time
Neural Jack	11	Lv12000	1 hours

Frontier Cybernetic Replacement

Crippling injuries in the 24th century can be simply repaired by growing replacement tissue from the Traveller's own cells and then grafting it on. On the Frontier, the time and resources needed are often scarce or even entirely unavailable. Cybernetic replacements are far more common and the installation and adjusting of cybernetics is a mature field; even an autodoc can do it. The cybernetics listed in *2300AD Characters and Equipment* are examples of the more advanced cybernetic replacements common in the Core and at select facilities on the Frontier. For everyone else, somewhat older and more robust replacements are the norm.

The embrace of these older, clearly more mechanical cybernetics can be read as support for the Hard Path and points to an increasing polarisation of opinion on the Frontier.

CYBERNETIC EYES

Cybernetic eyes are a very common, and useful, modification. Many Belter and Libertine crew-persons have them, usually with the flash-proof option. Poor vision is quite rare, especially in Core populations where minor and cosmetic gene fixing has been practiced for a very long time. Frontier cybernetic eyes are often larger and more robust, with little chance of them being mistaken for the real thing.

There are several option packages available for use with cybernetic eyes. The older models on the Frontier can only have two additional options added to them. However, they do not require surgery to install them.

Cybernetic eyes grant the Heightened Senses trait where vision is used and most models on the Frontier come with telescopic vision as standard, including a 1x to 40x zoom feature. All cybernetic eyes likewise come with a camera function, with internal storage for up to 300 still images or 60 seconds of video. These images or video can be downloaded by PAN to a Link phone

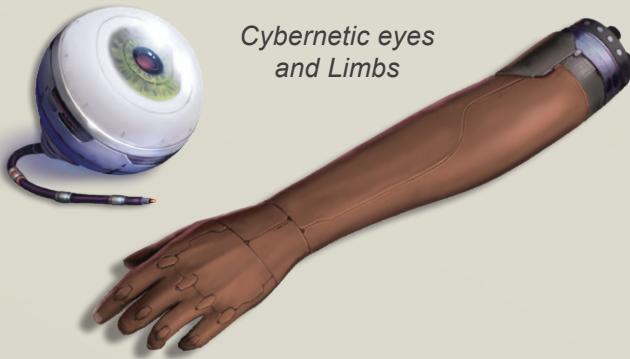


Shadow Clinics

The stories of 'shadow clinics' are often dismissed as urban folklore and have been the subject of numerous thrillers and body-horror vids and experientials. However, the American National Security (NSO) Office has a section on shadow clinics in their dossier on ProVolition. These clinics exist and are almost universally linked to ProVolition. That said, there is not a 'network' of aligned shadow clinics, exchanging clients, victims and technologies. Rather, there are a few, isolated illegal clinics that offer unauthorised and illegal augmentations. The only connection between them is their link to ProVolition. As far as the NSO can determine, ProVolition does not run or sponsor these clinics but rather acts as both supplier and purchaser of illegal technologies.

The exact number and location of these clinics is unknown but the NSO has some ideas. There are at least six on Earth, another two on Tirane and a scattering across the Frontier. In 2297, the Second Bureau raided a clinic in a seemingly abandoned building in downtown Adrian, the ESA city on the southern continent of Beta Canum. This clinic was making use of Pentapod technology alongside advanced medical techniques borrowed from the Sung. While there are few details, there are rumours that a number of Sung and Pentapods were also rounded up in the raid.

Shadow clinics are notoriously expensive but, contrary to the stories, very reliable. They depend on their clients and the clandestine referrals they provide. On Earth, the various clinics tend to specialise but on the Frontier such illegal clinics have a wider range of services available.



*Cybernetic eyes
and Limbs*

or portacomp. If the user has a subdermacomp and a neural bridge, they can store an effectively unlimited number of still images or several hours of video.

Augmentation	TL	Cost	Surgery Time
Cybernetic Eye	10	Lv3000/eye	2 hours

FLASH PROOF: This option protects the Traveller's vision from sudden flares of light, giving them the same protection as photosensitive goggles.

Augmentation	TL	Cost	Surgery Time
Flash Proof	10	Lv1200	—

LOW LIGHT: This option grants light-intensification capabilities in low-light environments.

Augmentation	TL	Cost	Surgery Time
Low Light	10	Lv1500	—

THERMAL IMAGING: Thermally-sensitive imagers are added to the base vision layer of a cybernetic eye, allowing vision without visible light, so the Traveller can see gradations in temperature. This is a common modification for Libertine and Belter crews.

Augmentation	TL	Cost	Surgery Time
Thermal Imaging	11	Lv2200	—

CYBERNETIC EARS

Cybernetic ears are an uncommon modification but enjoy a certain appeal with the avant-garde, as well as scouts and other explorers. Cybernetic ears grant the Heightened Senses trait where hearing is used. All cybernetic ears have the ability to record sound for later playback, a trivial feature where audio files can be downloaded through a PAN or inductive connection.

Augmentation	TL	Cost	Surgery Time
Cybernetic Ear	10	Lv1500	1 hour

LOW-FREQUENCY ACOUSTIC SENSOR: This ear replacement enables a Traveller to hear sounds below the range of normal humans. Ears with this option do not appear natural – they tend to be larger than normal and although constructed of cartilage and flesh, are often of an unusual shape (pointed at the top, for instance). This is not an add-on option and the ear must be installed with it when first fitted. These ears are popular with researchers studying the Eber, as it allows them to hear in the low-range of the Eber aural spectrum. It also grants DM+2 on all Recon and Investigate checks involving low-frequency sound.

Augmentation	TL	Cost	Surgery Time
Low-Frequency Acoustic Sensor	11	Lv3500	20 minutes

SOUND DAMPENER: Although loud or irritating sounds will not damage cybernetic ears, they can still be unpleasant for the Traveller. This option enables the Traveller to dampen specific ranges from the sonic spectrum, allowing sound to be filtered, which can make it easier to hear a specific sound (such as someone's voice) in a noisy environment. This usually requires a neural bridge for control, although it could be activated from a skinwatch or Link phone through a PAN.

Augmentation	TL	Cost	Surgery Time
Sound Dampener	10	Lv1250	20 minutes

CYBERNETIC LIMBS

As with eyes and ears, the cybernetic limbs found on the Frontier tend to be bulkier yet more robust and often stronger than their more sophisticated counterparts from the Core. Their artificial nature is obvious after only a cursory examination and many elect to make a point of emphasising the artificiality of their limbs. While this may be considered somewhat gauche in the Core, on the Frontier it is often a point of pride, a symbol of sacrifice to the community.

These heavy-duty cybernetic limbs have STR 7 (for arms) and END 8 (for legs) but can be improved up to a maximum of STR or END 13. In most checks using STR or END as a modifier, a Traveller's normal characteristic should be used but if the referee chooses, the STR or END of the cybernetic limb may be used instead. For example, if a Traveller is attempting to lift a heavy weight from the floor, their natural STR should be used, since all their limbs and torso muscles are involved. If, on the other

hand, the Traveller is hanging from a ledge by their cybernetic arm, the STR of the arm should be used in determining if they can hold on.

CYBERNETIC ARM: Cybernetics arms are the most common artificial replacement used on the Frontier. Limbs are often seriously injured or lost in equipment accidents or to wild animals, and relatively easy to replace. Arms include the hand but the hand is also available separately.

Augmentation	TL	Cost	Surgery Time
Cybernetic Arm (STR 7)	10	Lv10000	2 hours
Per point of STR increase	10	Lv8500	—
Cybernetic Hand	10	Lv3200	1 hour

CYBERNETIC LEG: Cybernetic legs allow a Traveller to walk or run further than their biological counterparts. Legs include the foot but the foot is also available separately.

Augmentation	TL	Cost	Surgery Time
Cybernetic Leg (END 8)	10	Lv8000	3 hours
Per point of END increase	11	Lv600	—
Cybernetic Foot	10	Lv800	1 hour

EQUIPMENT: A cybernetic limb may be constructed with any one-handed item of equipment built into it, including a firearm. The cost for cybernetic equipment within a limb is five times the value the equipment would normally be.

CYBERLIMB BATTERY: Cybernetic arms and legs require a power source, typically contained within the limb itself. This is usually a compact super-battery, which can supply power to the limb for up to 96 hours (four days) of constant use. These batteries can be recharged from any standard supply, including household current and portable generators, or quickly replaced if needed.

Item	TL	Cost	Surgery Time
Cyberlimb Battery	11	Lv50	—

CYBERNETIC ORGANS

Some internal organs can be replaced by cybernetic equivalents. Artificial organs are normally used only in emergencies, to be replaced by biological organs as soon as is feasible. In some cases, especially on distant Frontier worlds, the 'temporary' replacement becomes permanent.

Not all organs can be replaced. Some have a chemical or hormonal role that cannot be replaced or only for a very short period of time. The stomach, liver and pancreas cannot be replaced at all. The kidneys can be replaced for their filter functions but not the production of adrenaline. Sections of the small intestine can be replaced, but not the entire organ, and the large intestine cannot be replaced with a functional equivalent. The heart is a prime candidate for replacement, however. Although critical, its functioning is comparatively simple. Partial lung replacement is also possible but cybernetics are not as efficient. An artificial lung reduces a Traveller's END by -2.

Apparently the Sung have better success with cybernetic replacements and some Terran universities are looking to establish exchange programmes.

Item	TL	Cost	Surgery Time
Artificial Heart	10	Lv25000	6 hours
Artificial Lung	10	Lv20000	3 hours
Artificial Kidney	11	Lv14000	2 hours
Artificial Small Intestine	10	Lv9000	2 hours

Maintenance

Cybernetic legs require a considerable amount of maintenance and tuning, equal to TL-6 hours per month. For each month missed, the Traveller suffers DM-1 to all checks requiring movement and their speed drops by one metre. Cybernetic arms require less maintenance, only TL-8 hours a month but still inflict DM-1 to checks requiring their use. This penalty is cumulative for every month missed.

All other implants (eyes, ears, subdermals and so forth) require only yearly maintenance, at an hour per system.

Item	TL	Cost	Surgery Time
Maintenance	—	Lv100/hr	—

Cyberlimb Armour

All cybernetic limbs provide Protection +2, which can be combined with traditional armour. With materials commonly available on the Frontier, limbs can have additional armour installed, to a maximum additional Protection of TL-8.

Item	TL	Cost	Max. Protection	Surgery Time
Per point of Protection	11	Lv2000	TL-8	—

ASSISTIVE TECHNOLOGIES

Assistive technologies are a class of device that provide amelioration for physical and mental disabilities. These are distinct from implanted technologies and fall firmly on the Hard Path. Since the devices can be removed or not used, it is believed that they provide more agency and lifestyle choice to people with disabilities than implants or genetic modifications.

While invitro gene therapy has led to the elimination of most congenital disorders, at least those with a relatively simple genetic link, other more complex issues, especially neurological issues, cannot be corrected in this way. Therapies can also be harder to come by on the Frontier, where novel environments and ailments can effect genetic changes for which there is currently no treatment.

Mobility Assistance

Wearing an assistive exoskeleton (often called an assist exo) is not just as easy as putting it on and then being on your way. In general, many of the wearers of assist exos have mobility issues and may have sensory nervous issues, so care must be taken to ensure the exo is secure and does not rub or cause excessive pressure to any portion of the wearer's body.

Assist exos are often fatiguing to wear, especially if they are being used to allow movement in a higher than normal gravity. The general advice is to wear one for no more than four hours at a time.

MEDICAL MOBILITY EXO (MME): The medical mobility exo is designed for use with Travellers who may have spinal or motor-neuron injuries or disorders. These exos, although they fit like an exoskeleton in a walker, are not force-feedback. Rather, the legs and general body motion is computer-controlled. The wearer is really a passenger, giving the exo direction but not directly controlling it. The exception would be an exo controlled by a neural link which is totally under the user's control, although there are fail-safes to ensure solid footing and balance.

Exo-Type	TL	STR	Power Duration	Mass	Cost
MME	9	—	6 hours	10 kg	Lv10000
Neural Linked	11	—	—	—	Lv15000

HIGH GRAVITY MOBILITY EXO (HGME) The high gravity mobility exo is the most commonly seen mobility exo, one designed to aid otherwise healthy Travellers from a low gravity environment to get around in higher gravity. Unlike models for spinal or nervous system disorders, these assist exos are force-feedback controlled, although the force required to impacts movements is lower than in a cargo exo.

Exo-Type	TL	STR Bonus	Power Duration	Mass	Cost
HGME-A	10	+2	6 hours	12 kg	Lv12000
HGME-B	11	STR +4	4 hours	22 kg	Lv20000
HGME-C	12	STR +6	2 hour	35 kg	Lv35000

ALL-TERRAIN MOBILITY EXO (ATME): Unlike typical mobility exos, the all-terrain version is equipped with more powerful myomers in the limbs, computer-controlled feet for optimal terrain-crossing ability and better overall support for the wearer. It is primarily intended to provide mobility for users from lower-gravity environments or with other mobility issues.

Exo-Type	TL	STR Bonus	Power Duration	Mass	Cost
ATM	11	+2	6 hours	12 kg	Lv18000

Mobility Chairs

Regenerating or bypassing spinal damage is difficult, especially on the Frontier where most medical facilities are not up to the task. It can be time-consuming and there is an element of risk involved, depending on the amount of damage. A lost limb can be replaced but spinal damage is difficult to get around. Some people also may also be able to walk but sometimes require a chair for a wide variety of reasons. Mobility chairs accommodate that as well, without the fatigue of an assist exo.



Hover Chair



Off-road Chair

Mobility chairs have a number of common features, differing in the form of locomotion used. Most have custom seating to minimise pressure points and rubbing. Most are powered, using a high-density battery or fuel cell to provide electricity. One feature of all powered mobility chairs is the ability to raise the occupant to standing height, or a little taller, intended to give a psychological advantage.

HOVER CHAIR: Hover mobility chairs are rare. Unlike other hovercraft, they are not suitable for crossing rough terrain or any but the smoothest, calmest bodies of water. They are faster than any other mobility chair, however, although not capable of keeping up with a normal vehicle. Requiring smooth terrain and working best in urban environments, they can reach speeds of up to 45 kilometres per hour.

Item	Speed	Agility	TL	Kg	Cost
Hover Chair	10 m	+1	9	50	Lv6000

OFF-ROAD CHAIR: An off-road chair uses large diameter, high-traction wheels or tracks to enable off-road travel. They still require relatively level ground or cleared paths, as they are not all-terrain vehicles, even with tracks.

Item	Speed	Agility	TL	Kg	Cost
Off-road Chair	4 m	+0	9	80	Lv5300

WALKING CHAIR: The walking chair is starting to become more common on the Frontier. It features improved cross-country mobility with its four legs and improved stabilisation, and can handle rough terrain better than any other. While slower than a powered wheelchair, the extra mobility more than compensates.

Item	Speed	Agility	TL	Kg	Co
Walking Chair	6 m	+0	9	60	Lv6800

WHEELCHAIR: A wheelchair is still the most commonly-encountered mobility chair, and the only type that can be found as a hand-powered version. A powered chair typically has speeds of 8-12 kilometres per hour, although there are faster models and a range of up to 10 kilometres. The speed of a manual chair depends on the results of an Average (8+) STR check. Effect x 2 equals the speed in metres per round.

Item	Speed	Agility	TL	Kg	Cost
Powered Wheelchair	8 m	+0	9	50	Lv5000
Manual Wheelchair	—	+0	8	10	Lv100

Sensory Aids

While many sense-related impairments can be ameliorated with cloned tissue or cybernetics, others cannot. There may be reasons why a Traveller cannot use such assistance, from personal objection to implant intolerance and rejection.

Neural Induction Glasses

When blindness is caused by eye or retinal damage, but the optic nerve is still intact, neural induction glasses offer a means of restoring some degree of sight with only minimally-invasive surgery. A flap of skin at the temple is peeled back and a set of hair-fine electrodes implanted with a computer-

controlled needle. These electrodes are all placed within a millimetre of the optic nerve and the flap of skin resealed. Nerve tissue is then encouraged to branch from the optic nerve to the electrodes, forming a connection without damage to the optic nerve. The growth and connection process takes about 10 days.

The glasses appear to be a normal pair of sunglasses and are available in a variety of styles. Several small cameras ring each lens and feed data to a nanocomp, usually worn around the neck. The nanocomp processes visual information and feeds it to the implanted electrodes via an induction link contained in the arms of the glasses.

This gives the wearer almost completely normal vision. Due to the processing required, there may be lag or blurring when viewing fast-moving objects and the colour palette is somewhat muted.

Item	TL	Kg	Cost
Neural Induction Glasses	11	—	Lv1200
Electrode Installation	11	—	Lv1000

Neuroprocessing Assistance

Neurodivergent individuals have different thought processes than neurotypical people. This is not an illness, just a different way of thinking. Neuroprocessing assistance helps them adjust and communicate more effectively.

Neurodyne Daemon Expressive Translator

Many neurodivergent people have difficulty interpreting facial expressions and gestures, and likewise have difficulty in non-verbal forms of expression. The Daemon consists of a nanocomp, a small array of camera dots and an earpiece, all connected through a PAN. An expert system running on the nanocomp reads facial expressions and gestures, and informs the wearer what emotions are being expressed. While there are cultural variances, these systems are 80% accurate out of the box and for people the user interacts with on a regular basis, it can learn and adapt to their gestures and expressions, becoming 95%+ accurate over time.

A trained observer with Science (psychology) can use the Daemon to determine a target's emotional state and has a chance to determine if they are telling the truth.

Item	TL	Kg	Cost
Neurodyne Daemon Expressive Translator	11	0.5	Lv1800

Neurodyne Cyclops Audio Suppressor/Focuser

The Cyclops is an interactive device that allows neurodivergent Travellers to cope with crowded, busy rooms and situations. The device is designed to damp down, although not eliminate, any noise from more than one metre away. This allows the Traveller to focus on whomever they are conversing with, while reducing auditory sensory overload from the surroundings. This device can be fine-tuned to allow the Traveller to focus on subjects further away, such as in lecture halls or other public venues. It is also keyed to listen for the Traveller's name, so as to alert them that someone from outside the conversational area is trying to get their attention.

Interestingly, this same technology, if fine-tuned well enough, can allow a Traveller to eavesdrop on a conversation from across a crowded room – undoubtedly an unintended consequence.

The Cyclops includes a set of inconspicuous in-ear headphones, a nanocomp and a special contact lens. The system reads the focus of the lens and tunes to the subject and distance. All components are connected through a PAN.

Item	TL	Kg	Cost
Neurodyne Cyclops	11	0.5	Lv1800

Gravity Bed

Despite the name, the gravity bed does not employ any sort of magical 'gravitic' technology. Rather, it is designed to support and exercise individuals from low or zero-gravity environments when they must travel to areas of higher gravity. Gravity beds provide full body support while minimising pressure points and provide electrical stimulation to build up muscle mass over time.

While assist exos and mobility chairs are available, medical professionals recommend that visitors from low-gravity environments spend as much time in bed as they can when they visit more massive worlds.

Item	TL	Kg	Cost
Gravity Bed	10	60	Lv500

SECURITY AND PARAMILITARY EQUIPMENT

On Frontier worlds, police forces are a combination of conventional police, big game hunters, zoologists, psychologists and search and rescue personnel. On some worlds, they are also the local militia or at least provide the foundation of one.

Like most colonial professionals, police forces often have to make do with a few items of high technology and everything else improvised. It is a rare colony that will provide its police forces with the latest surveillance equipment, gauss weapons or neural disruptors. You will never see a police aerodyne away from the Core, nor Sortech's R78 autonomic riot dispersal spiders. Forensic kits, however, are more common and many police officers have a surplus Russian laser rifle or similar for high-risk take-downs. When they go out in the field, hunting the latest threat to come stalking out of the native forest, more often than not it is with civilian or surplus military equipment. Hunting

rifles, shotguns and large-calibre handguns are the preferred weapons. Against human opponents though, the sonic stunner and stun baton are the weapons of choice.

Police are expected to keep the peace as much as possible, as the loss of even one colonist can be a significant set-back, both in terms of the person and the effect this has on the community. Except in high risk situations, police are almost never authorised to use lethal force. The wide availability of stun weapons means that, if necessary, police forces can simply blanket an area with stunner fire, knocking out both perpetrator and victim, and then sort things out later. On Earth although, in a similar situation they will use microdrones and neural disruptor webs; safer technologies, although much more expensive.

SECURITY AND POLICE EQUIPMENT

The requirement for physical security is as real for colonists as it is for the inhabitants of a 500-storey megastructure on Earth. Not only do colonists have to protect against possible human intrusion, they must watch out for the sometimes hostile, or just curious, local fauna (and even flora, on some worlds).

Security systems are also a requirement for banks, medical centres and a variety of businesses and commercial facilities. While colonies tend to have lower crime rates than the Core nations, people are still people.

Lock Systems

One of the primary uses of technology in the security field is the creation of locking mechanisms.

Electronic Lock

An electronic lock is opened by use of a numeric combination keyed into its control panel or some other technology like a keycard or fingerprint scanner. As with a mechanical lock, it is possible for a combination or card to be possessed by unauthorised persons or for the owner to be coerced into opening a door. It is also possible for an electronic lock to be picked or broken but this requires great skill and an electronics security kit. The most common key used in the Core is an RF implant in the arm or leg, which is read by the lock when within one metre.

Electronic locks are rated in terms of the difficulty of an Electronics (computers) check.

Item	TL	Kg	Cost
Electronic Lock (Routine 6+)	9	0.25	Lv10
Electronic Lock (Average 8+)	10	0.1	Lv50
Electronic Lock (Difficult 10+)	11	0.2	Lv200
Electronic Lock (Very Difficult 12+)	11	0.3	Lv500
Electronic Lock (Formidable 14+)	12	0.5	Lv1000
Electronic Lock (Impossible 16+)	12	1.0	Lv2000
Alarm Link	9	—	Lv100

Mechanical Lock

The most primitive method of securing an entrance is to use a mechanical lock. Mechanical locks vary widely in the durability of their materials and sophistication of their workings but all can be circumvented with skill or force. As mechanical locks will open to anyone (authorised or unauthorised) who has the correct key or combination, they are less secure and therefore cost less. To open a mechanical lock without a key or combination, a Traveller must either pick the lock or break it. Some mechanical locks are linked to alarm systems, which incurs an extra cost.

Mechanical locks are rated by the difficulty of the Mechanic check required to circumvent them.

Item	TL	Kg	Cost
Mechanical Lock (Routine 6+)	7	—	Lv10
Mechanical Lock (Average 8+)	8	0.1	Lv80
Mechanical Lock (Difficult 10+)	9	0.2	Lv200
Mechanical Lock (Very Difficult 12+)	10	0.3	Lv600
Mechanical Lock (Formidable 14+)	11	0.5	Lv1200
Mechanical Lock (Impossible 16+)	12	1.0	Lv3000
Alarm Link	9	—	Lv100

Biometric Security Enhancements

Biometric security systems augment electronic security systems with an additional level of authentication and security.

Biometric Analyser

Biometric analysers read a variety of body indexes to determine identity, including height, weight, width, breathing patterns and bioelectric field. The full biometric analyser is one of the more accurate identity verifications technologies available. However, the process is time-consuming, taking about five minutes per person, and so is used only for the most secure facilities. It is widely thought to be impossible to fool a biometric analyser.

Fooling a biometric analyser: Formidable (14+) Electronics (sensors) check (2D minutes, INT). Requires an electronic security kit.

Item	TL	Kg	Cost
Biometric Analyser	12	200	Lv8000

Handprint Analyser

The handprint analyser is one of the most common forms of biometric security systems available. In its simplest form, the device is a scanning plate that can read the patterns of a human hand. It can then compare the image to a list of authorised handprints and permit or deny access. Most systems are set to trigger an alarm after one to three failures.

On Core worlds, handprints are often used to verify purchases, with the handprint used in place of a signature or keycard. Smaller systems can be used to secure briefcases, vehicles and even firearms.

Fooling a handprint analyser: Very Difficult (12+) Electronics (sensors) check (1D minutes, INT). Requires an electronic security kit.

Item	TL	Kg	Cost
Handprint Analyser	11	2	Lv700

Retina Scanner

The retina scanner is a common method of rapid security identification for secure locations. Banks use them for safety deposit boxes, for example. A retinal

scanner compares an image of the vein network at the back of the eye of the subject to records on file and permits or denies entry. Like other scanners, an alarm is triggered after one to three failures, depending on the system. Eye tracking is excellent, so small movements of the eye during the scan do not affect the quality of scan.

It is incredibly difficult to foil a retina scanner as only an exact copy of the correct retina, or direct tampering with the scanning mechanism, will produce an identification match where none actually exists. It is possible to do this with specially-made cyberoptics, or vat-grown replacement eyes, although both are very illegal.

Bypass a retina scanner: Formidable (14+) Electronics (sensors) check (1D minutes, INT). Requires an electronic security kit. Other solutions are possible; most systems do not require that the eye be alive, for example, or even attached. However, very high security systems will measure the eye for normal biological activity. A lack of such activity will trigger an alert.

Item	TL	Kg	Cost
Retina Scanner	11	4	Lv5000

Voice Analyser

Voice recognition units use a simple vocal input unit to obtain a voice print of a person seeking access to a secured area. This voice print is then compared against a file of voice prints. If a match is found, access is granted; if not, further security systems may be activated. Voice recognition technology is very accurate in the 24th century and can determine between an actual voice and a high-quality recording.

Bypass a voice analyser: Very Difficult (12+) Electronics (sensors) check (1D minutes, INT). DM+2 if a voice recording of an authorised person is available. Requires an electronic security kit.

Item	TL	Kg	Cost
Voice Analyser	11	6	Lv4000

Security Circumvention

Some items are not intended to provide security measures but rather to circumvent them.

Locksmith Kit

A locksmith kit contains tools for opening mechanical locks. On most worlds, it is illegal to possess a locksmith kit without a local license.

Item	TL	Kg	Cost
Locksmith Kit	11	2	Lv450



Electronic Security Kit

An electronic security kit is not intended to provide electronic security but circumvent it. It is usually even more illegal to own than a conventional locksmith kit. These kits grant DM+1 to bypass any electronic lock of a lower Tech Level.

Item	TL	Kg	Cost
Electronic Security Kit	12	3	Lv3000



Alarms

Alarms serve as warning to both trespassers and appropriate authorities.

Klaxon

A klaxon is any sort of noise-making alarm, typically a bell or siren. Volume can be adjusted up to 130 decibels, comfortably louder than a jet engine. A klaxon usually runs on power from the facility in which it is installed but may be purchased with a limited duration battery pack.

Item	TL	Kg	Cost
Klaxon	9	1	Lv50
40 Hour Battery Pack	9	2	Lv30

Security Gas System

Some high-security systems trigger the release of a gas often, but not always, accompanied by a klaxon. These systems require an enclosed, sealable area and a pumping system to flood the area with the gas and then evacuate it afterward. While there are a variety of security gases available, great care must be taken to apply an appropriate dosage for a given volume and number of people affected. A lethal overdose is possible with any security gas.

The standard system can fill a 5 x 5 x 4 metres room.

Item	TL	Kg	Cost
Security Gas System	10	4	Lv1800

Security Gases

A variety of gases can be used with a security system, although military and police gases like VX gas (a nerve agent) and CN Gas (tear gas) are restricted.

DOZE

Sleep-inducing Doze is the gas most commonly used in security systems. Under some conditions, an overdose of Doze can induce heart failure, a coma or even death. Systems that use Doze are required to take into account the number of people in a room when determining dosage but this requirement is not always followed. If the system does not do so, then it will disperse the maximum volume of gas for that space. For every person less than 10 in the room, the system will inflict an additional 1D of Stun damage.

Doze causes 1D points of Stun damage per round until dispersed. A single application disperses in 2D rounds.

Doze should be used with care, however, as prolonged exposure to concentrated amounts can be lethal. When an individual has accrued Stun damage from Doze equal to twice the sum of their physical characteristics, they will either slip into a coma or die. The mass and cost are for a tank capable of filling a standard room as noted in the security gas system.

Item	TL	Kg	Cost
Doze	11	12	Lv600

FORALINE GAS

Foraline gas (often called 'Fear Gas' by the media) is typically used for crowd control by police forces in the Core. Many human rights groups, led by NARL, claim Foraline represents cruel and unusual punishment. Its use is not recommended in closed environments with other people present as induced panic might lead to violence.

Foraline induces a feeling of panic or fear at the slightest threat of danger, triggering a panicked freeze-or-flee response, heavily-weighted to 'freeze'. This allows police and security forces to contain riots and intruders.

Travellers exposed to Foraline must succeed at a Difficult (10+) END check or be unable to perform any action which they perceive as placing them in danger. If the check fails, the negative Effect determines how many minutes they will be affected. At the end of that time, they can make an Average (8+) END check. Again, if this check fails, they will continue to be affected by Foraline for a number of minutes equal to the negative Effect.

Item	TL	Kg	Cost
Foraline	11	10	Lv1500

Intrusion Detection

Alarms can be triggered by attempts to pick locks or bypass other security systems. There are a variety of intrusion detection systems available.

SIMPLE INTRUSION DETECTION

Floor and display pressure sensors, entrance switches and simple beam sensors are all examples of simple intrusion detection systems and relatively simple for a trained professional to circumvent.

Pressure sensors detect changes in pressure on their surface, either something being added or removed. Their sensitivity can be adjusted.

Entrance switches are the simplest perimeter security measure and detect whether a window, door or other access point has been opened. Many buildings have this built-in as part of their system monitoring function. A beam sensor, also termed a laser tripwire, is a light beam the triggers an alert if interrupted.

Bypassing one of these systems: Routine (6+) Electronics (sensors) check (1D rounds, EDU) or an Average (8+) Streetwise check (1D rounds, INT).

Item	TL	Kg	Cost
Beam Sensor	8	0.1	Lv80
Entrance Switches	7	—	Lv10
Pressure Sensor	7	0.1	Lv500

COMPLEX INTRUSION DETECTION

Complex intrusion detection includes motion sensors, air current sensors, thermal sensors and even millimetre-wave radar and ground-penetrating radar. These systems are very good at noticing changes in the area they protect and are difficult to bypass, even for professionals.

Motion sensors are keyed to detect movement, using infrared beams reflected off surrounding surfaces. With the right equipment, these beams can be detected and even seen.

Thermal scanners are passive systems detecting heat sources above or below ambient temperature. These systems often incorporate a motion detector as well but it is passive, keyed to detect moving heat sources.

Radar systems are designed to detect specific shapes and materials, including human skeletons and cybernetic components. It is very difficult to fool without access to some very specific and expensive equipment.

Bypassing these systems: Very Difficult (12+) Electronics (sensors) check (2D minutes, EDU). If more than one such system is in use, the check becomes Formidable (14+).

Item	TL	Kg	Cost
Motion Sensor	9	1	Lv200
Thermal Sensor	10	1	Lv2200
Radar Scanner	11	2	Lv20000

Intelligence-Gathering Equipment

Intelligence and law enforcement agencies require the use of sophisticated equipment to gather information.

Forensics Kit

The basic forensics kit is an item commonly used by agents and officers from nearly every settled world to gather evidence for solving crimes. The kit attaches to a portacomp or bodycomp (a nanocomp is not powerful enough) and includes an array of visual and chemical sensors, data analysers and specialised memory chips. An agent using the kit can match fingerprints with sets in the kit's memory chips or from a planetary Link network, perform forensic ballistics analysis on weapons rounds, make chemical tests such as blood type determination and do limited DNA analysis. The forensics kit also includes a polygraph and a program that will allow the portacomp to indicate the truthfulness of a subject's statements, although much of the judgment is left up to the operator's skill, requiring a Difficult (10+) Investigate check (1D minutes, EDU). The forensics kit otherwise provides DM+2 to appropriate Investigate checks beyond use of the polygraph kit.

Item	TL	Kg	Cost
Forensics Kit	11	5	Lv1200



Forensic Kit

Surveillance Equipment

The following devices are often used by security teams, police and government agencies.

Bug

The Trilon Industries Monitor Bug is a cylinder one millimetre in diameter and four millimetres long, with a one-centimetre, hair-thin antenna. It can be hidden almost anywhere in a room and will pick up whispered conversations within five metres. Most bugs are voice-activated and have a transmission range of up to two kilometres. The device will transmit for up to 72 hours on internal power before it dies. Within three weeks, the silica plastics it is made of will have decomposed into dust. Removing the bug from its wrapper activates it and starts the decomposition timer. Since it broadcasts constantly, it is relatively easy to detect by simply scanning relevant frequencies. Any backpack or vehicle communicator can be tuned to this bug.

Item	TL	Kg	Cost
Bug	10	—	Lv500

Cable Tap

This device is used to tap into electronic communications cables. An electric current produces a magnetic field, which can be detected and 'read' to tap the signal. This does not require cutting into the cable, produces no drop in voltage and is impossible to detect without physical inspection of the complete run of the cable. Fibre optic cables cannot be read in this fashion, however. That technology requires a much more sophisticated (and expensive) tap. This type requires cutting into the cladding around the cable but not the cable itself. A tap can be attached to a broadcast or recording unit, and acquire any data running down the line. Because of the danger of taps, important communications are always scrambled.

Item	TL	Kg	Cost
Cable Tap (copper)	9	1	Lv7500
Cable Tap (fibre optic)	11	1	Lv12000

Improved Bug

The Technion Systems Capensis (Hare) is an improvement to the standard bug. A 0.1 -millimetre sensor cable is run from the room to be bugged to the main unit, a cube about two centimetres on a side, up to 10 metres away. The cable can be threaded through ventilator shafts, pipes, electrical conduits or cracks in wall material (it can even be concealed under a thick coat of paint). Only the end of the cable needs to be in

the room being bugged. One end of the sensor cable detects sound within 10 metres and carries it to the main unit. The main unit records the sound and can do so for up to 72 hours before it needs to be recharged (although it can be hooked into a building's power supply for permanent emplacement). At any time, the user may either retrieve the main unit or activate it with a coded wave signal. If activated, the main unit then broadcasts its recording as a high-speed, condensed 'squirt' transmission, lasting just a few seconds.

This means it is almost impossible to find, since it is emitting no signal most of the time. Detectors have to key on faint power emissions from the main unit, which can be up to 10 metres away and can easily be confused with signals from other low-powered electrical equipment. Any backpack or vehicle communicator can be tuned to receive the signals from this bug.

Item	TL	Kg	Cost
Improved Bug	11	—	Lv2000

Laser Ear

The Aquitaine AuraOptika laser ear is a much more sophisticated and expensive version of the shotgun microphone. It bounces a laser beam off a rigid object near the target, as sound waves cause all objects they strike to resonate or vibrate. These vibrations affect the reflected beam, which is received by the unit. The computer in the handset converts the received signal into sound. The resonating object must be relatively close to the target, it must be rigid and it must be in line of sight (although the target itself need not be). Conversations are usually recorded by any available comp or Link phone.

Item	TL	Kg	Cost
Laser Ear	11	3	Lv2000

Shotgun Microphone

The MacroComp Pk-7 shotgun microphone is a common example of low-technology listening devices. A shotgun microphone is directional, meaning it can be aimed at a specific spot up to 200 metres away and picks up any conversation from that spot. A shotgun mike must have a direct line of sight to its target. Most sounds outside the target area will not be picked up but loud noises (such as shouts and gunshots) will be.

Item	TL	Kg	Cost
Shotgun Microphone	10	2	Lv400

Surveillance Implant

The EarWitness surveillance implant is a glass capsule implanted just behind the ear or along the scalp, hidden under hair. The sensitive microphone can pick up anything the wearer can hear and either retransmit it or simply record to be played back later. If used to transmit, it is a smart system, with a frequency-agile narrowcast that is difficult to detect. Unfortunately, the implant has a short range, usually no more than 100 metres. Implantation can be done in moments and finding the glass capsule requires a Formidable (14+) Medic or Investigate check (1D minutes, INT).

Item	TL	Kg	Cost
Surveillance Implant	12	—	Lv800

Video Bug

The Technion Systems 'Odonata' (Dragonfly) is an enhancement to the improved bug. It receives its name from the superior vision of the dragonfly, the sharpest eyesight of any terrestrial insect. A one-millimetre fibre optic light guide, with a fisheye lens at one end, is connected to a recording/broadcast unit up to 10 metres away. The unit is not up to full tri-d broadcast quality but is good enough for most surveillance purposes and has limited low-light capabilities as well. Total darkness (which is rare) will foil this system. Any backpack or vehicle communicator can be tuned to this bug.

Item	TL	Kg	Cost
Video Bug	11	4	Lv3700



(ECM) Electronic Countermeasures

The following items can be used to detect and counter electronic surveillance. They are illegal at Law Level 6+.

Momotaro 'Omni' Sensorlect

The Omni is a simple detection unit found on most military and some civilian vehicles, which is used to indicate when the vehicle has been scanned by an active sensor of some kind. When one of these units picks up electromagnetic radiation matching certain characteristics, it indicates the fact by an aural and/or visual signal. Simple units only key to one type of sensor (radar, laser, microwave and so forth). Units available at three times the price will be able to pick up all commonly used sensor systems. If the Sensorlect is blocked inside a vehicle, it would be unable to detect lasers and microwaves but could still detect radar.

Using a Sensorlect requires a Routine (6+) Electronics (sensors) check (1D seconds, INT). Sensorlects installed in a vehicle consume no Spaces but require a sensor operator.

Item	TL	Kg	Cost
Sensorlect	11	1	Lv400

Radar Jammer

Radar works by bouncing a signal off its target and interpreting the results. Jamming a radar is as simple as broadcasting random noise on the radar's frequency at a higher power level than the reflected signal. Jammers usually broadcast on a wide band of frequencies and negate the effects of all radar within their range (one to ten kilometres, depending on price). Jammers function automatically but a skilled sensor operator can sometimes 'burn through' jamming with a Difficult (10+) Electronics (sensors) check (1D rounds, INT).

Jammers are usually operated remotely because they become easy targets for ARMs (anti-radiation missiles). They do not affect laser-based detectors, such as rangefinders and missile homing guidance systems.

Item	TL	Kg	Cost
Radar Jammer	11	4	Lv6000

Radio Jammer

Most large, multi-frequency, two-way radios can be used as simple jammers. All that needs to be done is broadcast a very powerful carrier wave on the frequency to be jammed. More sophisticated radios, however, can shift frequencies at pre-set intervals and escape jamming. Modern military communications are even more sophisticated. Tight-beam lasers or microwave communications can be directed up to a satellite and then reflected down to individual receivers, making communications very difficult to jam.

Item	TL	Kg	Cost
Radio Jammer	12	10	Lv3000

Bug Detector

Bug detectors are used to find electronic surveillance devices. For the basic broadcast bug, this is simply a matter of scanning relevant frequencies until the bug's signal is picked up, then triangulating until it is found, whereupon it can be destroyed or neutralised. More sophisticated bugs are tougher to find. A bug detector suffers DM-2 to detect a bug of a higher Tech Level.

Detecting a Bug: Difficult (10+) Electronics (sensors) or Investigate check (1D minutes, INT).

Item	TL	Kg	Cost
Bug Detector	11	4	Lv5000

Bug Jammer

Bug jammers work like radio jammers. If a bug never broadcasts (for example, if the bug is used to record a conversation and physically retrieved later), a jammer will not work. It also will not work against the laser ear. Bug jammers work automatically.

Item	TL	Kg	Cost
Bug Jammer	11	0.5	Lv1500

Momotaro Industries S3 Sensupress

The Sensupress transmits a field of white noise which washes out any normal conversation within one metre. A Sensupress unit will work against the laser ear but will not affect the video portion of a video bug.

Item	TL	Kg	Cost
Sensupress	10	3	Lv1500



Holofield

The holofield is a visual-light projector that creates a dome of subtly-shifting patterns that distort and partially block video and tri-d (including cybernetic eyes) cameras but have minimal effect on normal vision. Some bars will have holofields installed at tables and booths to ensure their guests' privacy.

Item	TL	Kg	Cost
Holofield	12	5	Lv5000

Scrambler

Scramblers are aftermarket encryption devices which attach to any normal communicator and scramble transmissions according to a prearranged pattern, which can only be descrambled by a unit with the same scrambler settings. They cannot be used with Link phones on a commercial network.

Item	TL	Kg	Cost
Scrambler	10	0.2	Lv500

Restraint Devices

Once a security system has highlighted an intruder, the priority then switches to capturing and restraining them.

Handcuffs

Typically made from high-tensile steel and featuring a Difficult (10+) mechanical lock, handcuffs are also available in composite material with Formidable (14+) electronic locks. Even the basic metal variety takes several minutes to cut through with power tools, although only a few seconds with laser or plasma cutters. Composite handcuffs are effectively impossible to cut with hand tools and even laser and plasma cutters will take time just to cut the binding bar.

Item	TL	Kg	Cost
Handcuffs (composite)	11	0.5	Lv250
Handcuffs	5	0.5	Lv80

Immobiliser

The NeuroTech Immobiliser is a risky piece of neuro-electronic equipment designed to immobilise dangerous prisoners for transport or temporarily hold them when high-security cells are not available. Electrodes are placed at the shoulders, hips and ankles, and a modulated current selectively interferes with the operation of voluntary motor functions. Side effects can

include loss of bladder and bowel control and, in some circumstances, the operation of pain receptors is either entirely blocked or sensitivity greatly increased. Long-term use can lead to neurological damage.

If used for longer than a day, the target of an immobiliser must make a Routine (6+) END check or have their DEX reduced by -1 for 1D days after the immobiliser is removed. There is a cumulative DM-1 per day of use.

Item	TL	Kg	Cost
Immobiliser	12	2	Lv5000

Zip Binder

These disposable plastic 'zip-strip' handcuffs must be cut off to be removed. The tough plastic is difficult to break but access to a pair of wire cutters will negate them in short order. They are typically used during mass-arrests when peace officers may run out of conventional handcuffs.

Item	TL	Kg	Cost
Zip Binder	9	0.2	Lv5

Vehicle Restraint and Disablement

Vehicles may need to be immobilised or even stopped while on the move and a variety of technologies are designed to do this.

Wheel and Fan Locks

Any wheeled or tracked ground vehicle can be immobilised by attaching locks to the drive wheels to prevent them from turning. Fan locks have the same effect on hovercraft. These locks can be removed with the appropriate vehicle tools and a Difficult (10+) Mechanic check (STR). They can also be picked, as Difficult (10+) mechanical locks.

Item	TL	Kg	Cost
Wheel Locks	6	15	Lv500
Fan Locks	8	12	Lv800

DeLisle ChemTech Inc. Gekkocott Foam

Gekkocott foam can be sprayed into intakes, fan ducts, engines or any other mechanical space, where it will adhere and solidify in a matter of minutes. Until the right catalyst is applied – and there are dozens of formulations – this foam will render any machinery

inoperable. However, with the application of the catalyst and then a light rinse with solvent, the machinery is good to go. One cylinder of the foam is enough to disable up to three vehicles and includes catalyst sufficient to remove all the foam.

Item	TL	Kg	Cost
Gekkocott Foam	11	2	Lv500

SecuriTech 'Haywire' Electronic Inhibitor

The electronic inhibitor is surreptitiously added to a vehicle's wiring or electronics and acts to disable it via a coded signal. Any vehicle originally built for the Core market and then shipped to a colony world will likely have an inhibitor already installed. Vehicles specifically designed for the colonial market typically do not. Police and government security agencies have access to control consoles that can read if a vehicle has an inhibitor, and then engage it. There is also a comp program that will do the same thing.

Item	TL	Kg	Cost
Electronic Inhibitor	11	0.5	Lv500
Inhibitor Console	11	1.2	Lv800
Inhibitor Control Software (Bandwidth 2)	11	—	Lv1000

Spike Belts

Modern spike belts incorporate pop-up spikes, which lie flat until a signal makes them suddenly pop up and lock. Another signal will trigger them to relax and go flat once again. This way, authorised vehicles can drive over the belt with no ill effect. Spike belts are laid across roads and trails with the goal of not just puncturing a vehicle's tires, which may have little effect in an era of run-flat or auto-inflating tires but also getting the spike belts caught up and entangled in a vehicle's drive train.

A spike belt will reduce a vehicle's speed by one Speed Band and Agility by -2. If Agility goes below +0, then speed is reduced by another Speed Band per point less than +0. It is only useful against wheeled vehicles.

Note that the effects of devices on a motorcycle are often catastrophic. The rider must make a Formidable (14+) Drive (wheel) check (DEX) to avoid a crash, with the Agility modifiers of the belt applied. For this reason, police may be hesitant to use them against bikers, except in a serious emergency.

Item	TL	Kg	Cost
Spike Belt	11	20	Lv200

NoEscape Against Kaefers

During the Kaefer assault on Aurore, a detachment of the Tanstaafl rural police tried their NoEscape on incoming Kaefer vehicles. It had no effect on the incoming bugbuses and crawlers, although it did disable their plasma guns. However, it worked very well on the three deathsleds that accompanied the attack, permanently disabling one and temporarily taking down the other two.

Quinn-Darlan NoEscape EMF Emitter

The NoEscape emits an electromagnetic field that can disable or destroy unshielded electronics. This includes the electronics used in modern vehicles but also older vehicles that rely on electrical discharge to ignite fuel. Diesel engines are immune to EMF emitters and human military vehicles of TL11+ are shielded against EMF weapons. Interestingly enough, use of this device against a Pentapod construct (or Pentapod, presumably) temporarily renders it blind.

EMF Emitters are also a potent defence against drones, although their use in built-up urban areas has to be restricted, due to their impact on *any* unshielded electronics, including consumer and medical devices.

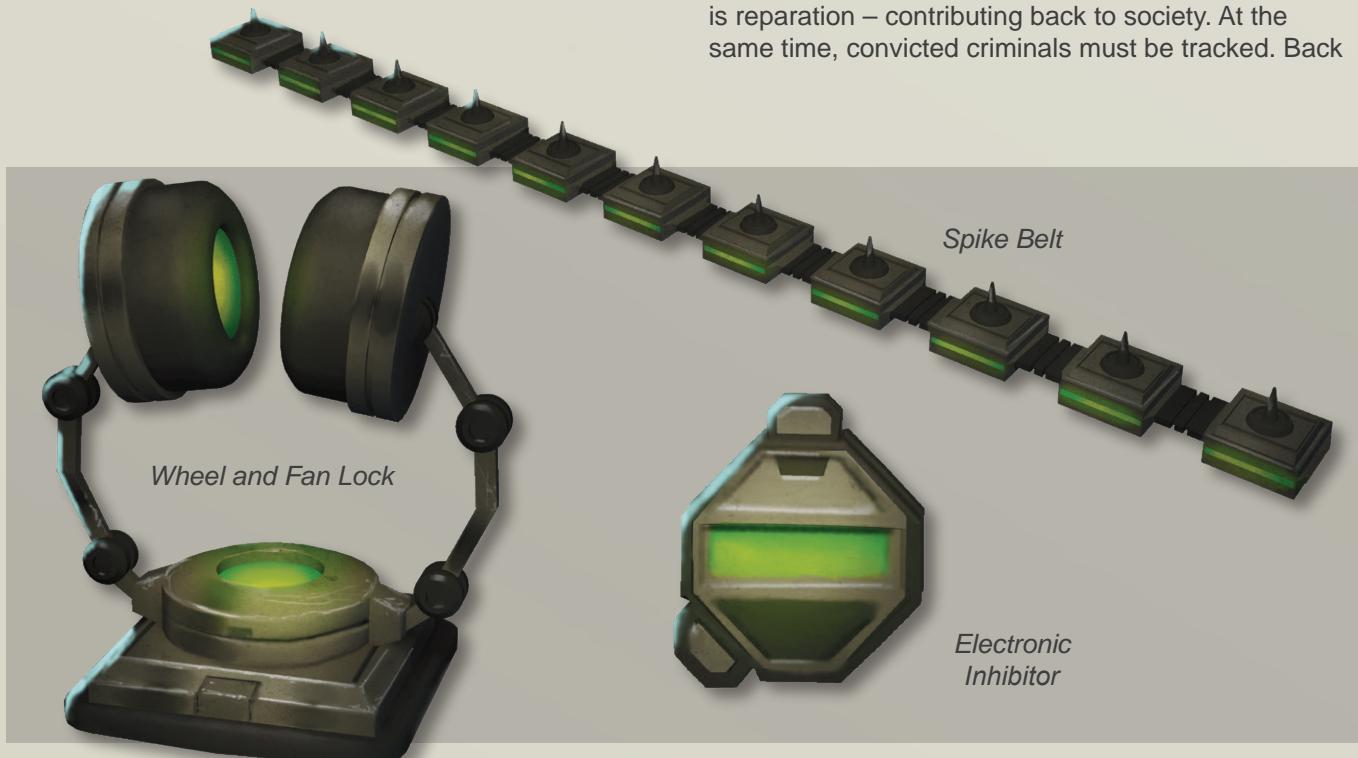
Although the NoEscape is intended for police use, use of one will always trigger an inquiry. The EMF pulse is sufficient to burn out most consumer electronics and this includes cybernetic implants, which may be necessary for the life of a vehicle's occupant. Use of the NoEscape may even endanger bystanders or at least their electronics.

The NoEscape is aimed and fired using the Heavy Weapons (portable) skill, with a range of 100 metres. Success means the vehicle has been hit and the Effect determines the results. On +1, the vehicle is slowed down by a Speed Band for 1D rounds, after which it can continue at normal speed. On +2–5, the vehicle is momentarily disabled, with speed reduced to 0 for 1D rounds. Stopping a disabled vehicle safely requires a Difficult (10+) Drive or Flyer check (1D seconds, DEX), with DM-2 for motorcycles, hovercraft and aircraft. In police use, the NoEscape has a number of epithets, including God Gun and NoGo Gun. In conversations with the press or general public, however, officers are usually enjoined to not use the word 'gun' to describe the NoEscape. Emitter or projector are preferred.

Item	TL	Kg	Cost
EMF Emitter	12	10	Lv12000

Personal Tracking Devices

Frontier worlds tend to lack much in the way of jail cells or jailers. In most colonies, the preferred option is reparation – contributing back to society. At the same time, convicted criminals must be tracked. Back



on Earth, small microchips can be inserted under the skin and the person tracked through the pervasive surveillance network which is the norm in most nations. Recognition systems on street corner cameras and floating surveillance drones can track a person by face or their gait.

On the Frontier, however, that sort of ubiquitous surveillance is not available. Most tracking devices connect to the local Link network if available or use basic radio communications and a GPS link to the planetary navigation grid. Any authorised comp can tap into the local network to determine the location of the tracking device and presumably, the monitored person. The trackers provide a DM to Electronics (sensors) checks to track them and how accurate they are in their placement is also noted. It takes a concerted effort to hide signals from a tracking bracelet of any sort.

SecuriGard Systems 'Argus' Link-enabled Tracker

The Argus uses the Link system to report on the location of its bearer and is accurate to within one metre. It uses the multiple antennae of the Link network to triangulate the location of the tracking device. The Argus has a composite case and band, almost impossible to cut, that is fastened with a Very Difficult (12+) electronic lock. The battery on the Argus is good for two years. If tampered with, the device will emit an ear-piercing screech and immediately notify whichever authorities are tracking it. Likewise, if the wearer leaves their

prescribed zone, the Argus will emit the screech and begin to flash. In some jurisdictions, it is also equipped with a shock pad that will shock the wearer until they return to the proper location. In any event, it will notify authorities of the transgression.

The composite band can be cut by industrial cutting equipment but damage to the wearer is very likely.

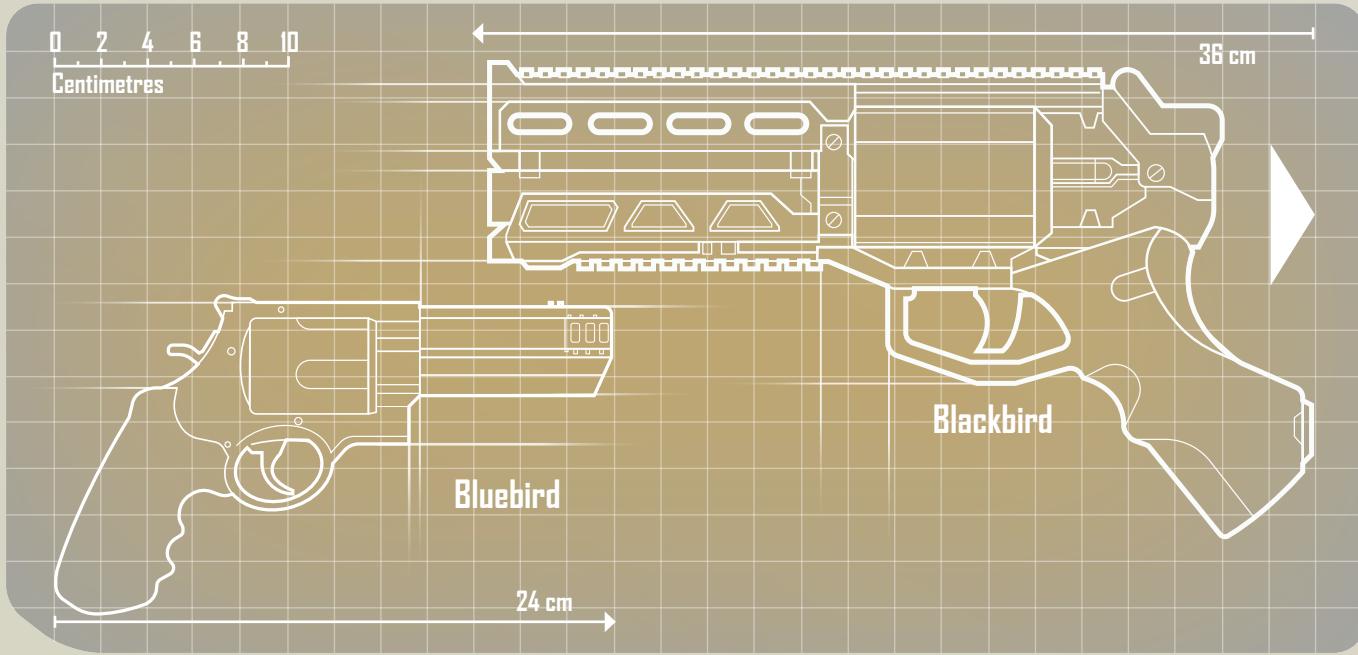
Item	Accuracy	DM	TL	Kg	Cost
Link-enabled Tracker	1 m	+4	11	0.2	Lv1100

SecuriGard Systems 'Janus' Radio Tracker with GPS

Using the planetary navsat network and a radio broadcasting unit, the Janus can be pinpointed to within three metres. The battery on the tracker is good for three months. It is built in a similar configuration to the Argus, with similar effects if it is tampered with or the wearer leaves their prescribed zone.

A longer ranged, but less accurate, version called the Polyphemus is also available. It constantly broadcasts, making it very easy to track.

Item	Accuracy	DM	TL	Kg	Cost
Radio Tracker	3 m	+4	10	0.25	Lv800
Polyphemus	100 m	+6	9	0.6	Lv2000



WEAPONS AND ARMOUR

The Frontier is a dangerous place and the ability for a colonist to protect themselves and those they hold dear is paramount on many worlds. The need for weapons for hunting, defence and recreation are well-established on most colony worlds, which have far less restrictive gun laws than any nation on Earth. Many worlds have wildlife that, if not inimical to humans, is to their livestock.

MELEE AND IMPROVISED WEAPONS

Most melee weapons available to the civilian population are as much tools as actual weapons. Purpose-made melee weapons are not commonly available.

Improvised weapons

Most improvised weapons are common objects not designed as weapons; chair legs, bottles, frying pans and whatever else may be handy. Improvised weapons fall into one of two categories: bashing and slashing. Bashing weapons can be used to inflict normal or stun damage. Slashing weapons only inflict normal damage.

Frying pans, carpentry hammers, shovels, chairs, bowling pins, bottles and similar objects are bashing, while broken bottles, scissors, screwdrivers, shattered windows and spike-like objects are slashing. Each time an improvised weapon is used, roll 1D. On a 6, the weapon breaks and is unusable.

Weapon	TL	Damage	Kg	Traits
Bashing	3	1D	1-3	Stun
Slashing	3	1D-1	1-2	—

Melee Weapons

While perhaps not purpose-built as weapons, these tools are nonetheless effective.



CIVILIAN FIREARMS

Most weapons found in civilian hands are light pistols, hunting rifles and shotguns. Indeed, on the Frontier the multi-purpose shotgun is the go-to weapon of choice for farmers, ranchers and miners.

Rawlings Group

The Texas-based Rawlings TransNat produces many items, from kitchen equipment to farm machinery. Their most famous product, however, is the Rawlings 'Bird' series of heavy revolvers. They received a tremendous boost when the Department of Public Safety (DPS) selected the Rawlings Redbird as the standard sidearm for the Texas Rangers.

Bluebird 9mm (.357 Magnum)

The Bluebird is a classic wheelgun, loading six shots in a cylinder forward of the pistol grip. Unlike most modern revolvers, it fires from the top chamber on the cylinder, rather than the bottom, resulting in a weapon with higher felt recoil than the heavier Redbird but in more of a classic revolver configuration. These weapons are popular with Texans, both on Earth and on the Frontier, partly for the more traditional look.

Melee Weapon	TL	Range	Damage	Kg	Cost	Traits
Hand Pick	2	—	2D	1	Lv50	AP 5
Hatchet	3	3 m	2D+2	0.5	Lv250	—
Machete	3	—	2D	1	Lv20	—
Sledgehammer (heavy)	2	—	3D	4	Lv80	Bulky
Sledgehammer (light)	2	2 m	2D	2	Lv240	—
Wood Axe	3	—	3D	2	Lv280	Bulky

Martial Arts for a New World

The native life of Cold Mountain is so unrelentingly hostile that the Manchurian colonists have taken to calling them Demons. In the oxygen-rich lowlands of the planet, these creatures are an almost unstoppable threat. Coupled with other, larger creatures that have been observed from a distance, the mountains are the only place of safety for colonists. In these tall peaks, the lower oxygen content slows Demons to the point that humans have a chance. Even then, the colonial nature of these organisms, lack of vital organs and their still remarkable speed makes them hard to kill. Firearms are next to useless, with bullets passing through thin bodies without causing much harm. In the fight against Demons, the colonists had to turn to other means.

Ancient martial arts were revised and adapted for use on Cold Mountain, emphasising the use of weapons to hook, pin and restrain Demons until swords and axes could be brought to bear. The sharp blades and edges associated with many of the Demon species led to the adoption of almost medieval armour, as conventional non-rigid armour was sliced to ribbons. Chainmail-style armour, whether of steel or lightweight ceramic, became commonplace, especially among guards and workers who toiled close to the walls that surround the colony.

This new martial art was called the Way of the Hard Mountain and while some of its forms derive from traditional Shaolin practices, it is more practical and oriented towards combat with uncooperative opponents. The basic forms can be acquired quickly, while mastery only comes to those who face Demons in combat. The Way of the Hard Mountain is only available to Travellers from Cold Mountain. It is a form taught only to residents of the colony; the teachers are not interested in spending their time with someone who will not contribute to the colony's defence.

Type:	9mm conventional revolver
Country:	Texas
Length:	24 cm
Action:	Single shot
Mass (empty):	1.1 kg
Ammunition:	9 x 29mm fixed cartridge ball (.357 Magnum calibre in Texas)
Muzzle Velocity:	900 mps
Magazine:	6 rounds internal cylinder
Mass of six rounds:	0.25 kg
RoF:	40 rpm

Redbird 11.2mm (.44 Magnum)

The Redbird was chosen in 2291 as the standard sidearm for Texas Rangers on extra-terrestrial postings, due to its compact design and high first-shot stopping power. Rangers will carry other weapons in their vehicles for sustained firefights but the ability to end a fight before it really starts was given priority over staying power. While the weapon is popular with Rangers, and many outside Texas, the conventional layout, firing from the bottom of the cylinder rather than the top, has made it less popular with the average Texan, who seems to prefer the classic 'wild west' layout.

Type:	11.2mm conventional revolver
Country:	Texas
Length:	32 cm
Action:	Single shot
Mass (empty):	1.4 kg
Ammunition:	11.2 x 30 mm fixed cartridge ball (.44 Magnum calibre in Texas)
Muzzle Velocity:	1,020 mps
Magazine:	6 rounds internal cylinder
Mass of six rounds:	0.35 kg
RoF:	40 rpm

Rawlings Blackbird

This heavy revolver has become a status symbol for officers in many mercenary units. It is not commonly seen in police forces, although the Rangers on Kormoran are said to be looking into the Blackbird due to the sheer size and toughness of the Ebers they encounter, especially nomads.

Rawling Group	TL	Range	Damage	Kg	Cost	Magazine	Magazine Cost	Traits
Blackbird	10	80	5D	2.3	Lv1200	5	Lv15	Bulky
Bluebird	10	50	3D+3	1.35	Lv600	6	Lv12	—
Redbird	11	70	4D+3	1.75	Lv800	6	Lv18	—

The heavy 12.7 mm round has incredible stopping power, at the expense of magazine capacity and recoil. Like most modern revolvers, it fires from the bottom chamber of the cylinder rather than the top.

Type:	12.7mm conventional revolver
Country:	Texas
Length:	36 cm
Action:	Single shot
Mass (empty):	1.9 kg
Ammunition:	12.7 x 35 mm fixed cartridge ball (.50 calibre in Texas)
Muzzle Velocity:	940 mps
Magazine:	5 rounds internal cylinder
Mass of six rounds:	0.30 kg
RoF:	40 rpm



Traylor Arms

Traylor Arms makes a number of semi-automatic handguns, ranging from the tiny 9 mmS wallet gun to the well-known 9mm Chip Traylor Special, all the way up to an 11mm wrist-breaking monster.

Traylor Arms C4 'Wallet Gun'

The 9 mmS (short) C4 pistol is extremely compact and concealable, although the round is noted for its poor stopping power. This is not a weapon to carry in the bush; it is strictly a concealed-carry weapon. The gun features a built-in flashlight and laser sight but lacks iron sights.

Type:	9 mm conventional autopistol
Country:	United States
Length:	12 cm
Action:	Single shot
Mass (empty):	0.5 kg
Ammunition:	9 x 15mm fixed cartridge ball
Muzzle Velocity:	390 mps
Magazine:	7-round removable box magazine
Mass of seven rounds:	0.1 kg
RoF:	80 rpm

Traylor Arms M-20 11mm autopistol

Firing a more powerful round than even the Rawlings Redbird, the Traylor Arm M-20 is gas-operated, reducing the felt recoil over a comparable recoil-operated weapon. The high-powered round is rare in civilian and law enforcement usage.

Type:	11mm conventional autopistol
Country:	United States
Length:	33 cm
Action:	Single shot
Mass (empty):	1.4 kg
Ammunition:	1 x 30mm fixed cartridge ball
Muzzle Velocity:	610 mps
Magazine:	10-round removable box magazine
Mass of full magazine:	0.5 kg
RoF:	80 rpm

Traylor Arms	TL	Range	Damage	Kg	Cost	Magazine	Magazine Cost	Traits
C4 Wallet Gun	10	5	2D-2	0.6	Lv400	7	Lv2	—
M57	10	30	3D	0.73	Lv300	20	Lv14	—
M-59	11	40	3D+2	0.98	Lv500	18	Lv18	—
M-20	11	70	4D+2	1.9	Lv1200	10	Lv15	—

The 9mm Chip Traylor Special is an extremely common firearm across the American Arm and the Core. It is less common on the French Arm and generally only seen in the hands of criminals on the Manchurian Arm.

Type:	9mm conventional autopistol
Country:	United States
Length:	20 cm
Action:	Single shot
Mass (empty):	0.6 kg
Ammunition:	9 x 24mm fixed cartridge ball
Muzzle Velocity:	460 mps
Magazine:	20-round removable box magazine
Mass of twenty rounds:	0.13 kg
RoF:	80 rpm

M-59 10mm Police Special

The 10mm Traylor Police Special is, as the name implies, popular with police forces for its stopping power and high magazine capacity. It is based on the same frame as the popular Chip Traylor Special. Copies of this gun are common with police and security forces on the Manchurian Arm.

Type:	10mm conventional autopistol
Country:	United States
Length:	21 cm
Action:	Single shot
Mass (empty):	0.8 kg
Ammunition:	10 x 32mm fixed cartridge ball
Muzzle Velocity:	540 mps
Magazine:	18-round removable box magazine
Mass of loaded magazine:	0.18 kg
RoF:	80 rpm

Shotguns

Shotguns are versatile and easy to use weapons. Models firing shot rounds can virtually guarantee a hit at short ranges, while the large bore permits specialised rounds like rubber batons, gel rounds and electroshock caps.

Traylor Arm Wildcat Shotgun

The Traylor Arms Wildcat is a typical semi-automatic shotgun designed for civilian use. With seven rounds under the barrel, it has a fair ammunition capacity. As a semi-automatic weapon, although, it cannot fire some of the more specialised rounds, which are too low-

Shotgun Conversion

A semi-automatic shotgun can be converted to a fully-automatic weapon with a Difficult (10+) Mechanic check (1D hours, INT). This requires a Gunsmith Kit and gives the weapon the Auto 2 trait.

powered to operate the weapon's action. In colonies of Law Level 7+, a plug must be inserted in the magazine to reduce the capacity from eight rounds to three.

Type:	18mm semi-automatic shotgun
Country:	United States
Length:	112 cm
Action:	Single shot
Mass (empty):	2.2 kg
Ammunition:	18 x 60mm shotgun shell
Muzzle Velocity:	400 mps
Magazine:	7-round internal tube magazine
Mass of seven rounds:	0.4 kg
RoF:	60 rpm

Stracher M33 Pump Action Shotgun

The M33 can be switched between pump-action and semi-automatic with the flip of a switch. The advantage of the pump action over the gas-operated semi-automatic is the ability to fire specialised low-velocity rounds like mini-grenades and cap shells. The M33 is found with settlers and police forces all over the French Arm, although on worlds of Law Level 7+ a plug must be inserted in the magazine to reduce the capacity from eight rounds to three. It features an extendable stock but is usually carried in the stowed position.

Type:	18mm semi-automatic shotgun
Country:	Austrovenia
Length:	94 cm
Action:	Single shot
Mass (empty):	2.4 kg
Ammunition:	18 x 60mm fixed cartridge buckshot (9 x 8 mm slugs)
Muzzle Velocity:	420 mps
Magazine:	8-round internal tube magazine
Mass of eight rounds:	0.4 kg
RoF:	80 rpm

DunArmCo Dingo

The Dingo is a basic side-by-side double-barrelled shotgun. It is used primarily for hunting, although the ability to fire both barrels at once makes it a very intimidating home defence weapon.

Type:	18 mm shotgun
Country:	Australia
Length:	95 cm
Action:	Single shot
Mass (empty):	2.5 kg
Ammunition:	18 x 60mm fixed cartridge buckshot (9 x 8 mm slugs)
Muzzle Velocity:	420 mps
Magazine:	2 rounds
Mass of two rounds:	0.1 kg
RoF:	40 rpm

Arno Astra Shotgun

Produced by Arno for the colonial market, the Astra 11mm shotgun is ideally suited for the younger shooter. Only birdshot and a small buckshot round are available for this weapon, which is best suited for hunting flying animals and small game.

Type:	11mm single shot shotgun
Country:	Brazil
Length:	94 cm
Action:	Single shot
Mass (empty):	1.7 kg
Ammunition:	11 x 40mm fixed cartridge buckshot (5 x 8 mm slugs)
Muzzle Velocity:	340 mps
Magazine:	1 round in barrel
Mass of one rounds:	0.07 kg
RoF:	40 rpm

Wu-Beijing Hammer

The so-called Hammer is a recoil-operated shotgun, almost like a large pistol, firing a short version of the standard 18 mm shotgun shell. A five round box goes



forward of the trigger and it lacks a stock. It is marketed to ranchers and farmers on worlds with small, fast predators, as a defensive weapon that can be brought to bear very quickly. Many favour it for its intimidating appearance and considerable stopping power. Ironically, it is illegal on most Manchurian colonies.

Type:	18 mm semi-automatic shotgun
Country:	Manchuria
Length:	41 cm
Action:	Single shot
Mass (empty):	1.8 kg
Ammunition:	18 x 44mm fixed cartridge buckshot (9 x 8 mm slugs)
Muzzle Velocity:	370 mps
Magazine:	5-round removable box magazine
Mass of five rounds:	0.4 kg
RoF:	80 rpm

Shotguns	TL	Range	Damage	Kg	Cost	Magazine	Magazine Cost	Traits
Astra	10	60	3D	1.77	Lv140	1	Lv0.5	—
Dingo	10	80	4D	2.6	Lv200	2	Lv1	—
Hammer	10	50	4D	2.2	Lv600	5	Lv7	—
Stracher M33	10	80	4D	2.8	Lv650	8	Lv3	—
Wildcat	10	80	4D	2.6	Lv420	7	Lv3	—

Hunting Rifles

Rifles typically fire a smaller but much higher velocity round than shotguns. While they lack the short range shot spread and variable ammunition of a shotgun, rifles are far more accurate over longer ranges and ammunition is much more compact as well.

Stracher Kojote

The Kojote is a good, lightweight rifle suitable for people with slighter builds and is often used for target-practice and hunting small game.

Type:	5mm conventional light rifle
Country:	Austrovenia
Length:	59 cm
Action:	Single shot Bolt Action
Mass (empty):	1.2 kg
Ammunition:	5 x 15mm fixed cartridge ball
Muzzle Velocity:	650 mps
Magazine:	9-round internal tube magazine
Mass of nine rounds:	0.2 kg
RoF:	60 rpm

Giscard FC-68 (Fusil Chasseur 2268)

The FC-68 was designed with the Frontier colonist in mind and is widely used by French civilians on a variety of worlds. It combines a bullpup configuration (giving it a distinctly military look, one of its strongest selling features) with full-automatic fire. It does not come with a scope but one may be purchased.

The FC-68 is subject to DM-2 for Availability outside of the French Arm and is illegal on any Manchurian colony, no matter the Law Level.

Type:	5mm sporting rifle
Country:	France
Length:	75 cm
Action:	Single shot or bursts
Mass (empty):	1.0 kg
Ammunition:	5 x 15mm fixed cartridge ball
Muzzle Velocity:	630 mps
Magazine:	70-round box
Magazine Mass:	0.3 kg
RoF:	600 rpm

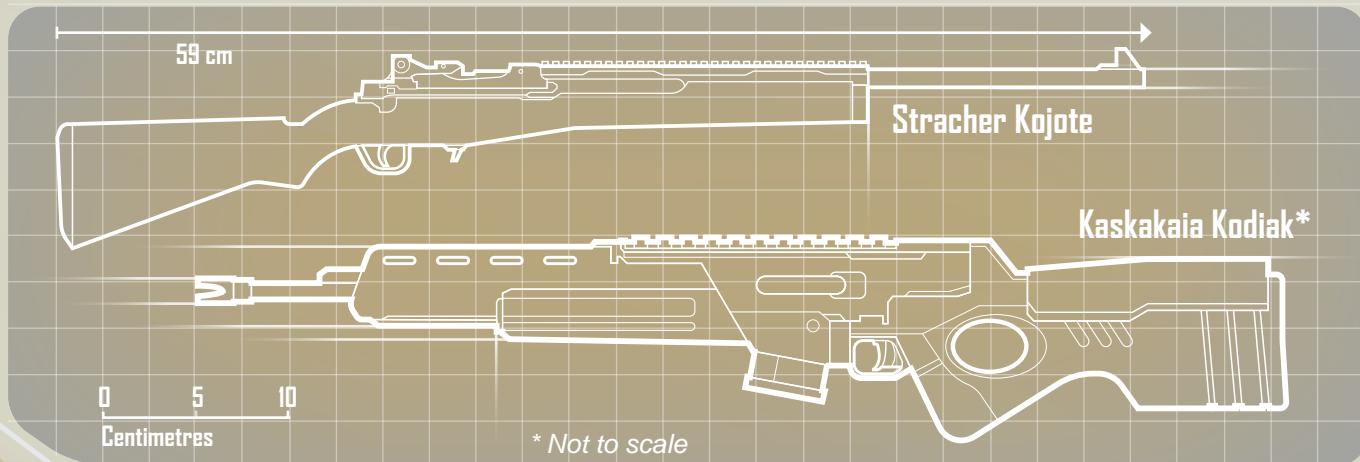
Giscard FC70 (Fusil Chasseur 2270)

The FC70 was designed to make use of the large quantities of 7.5mm surplus ammunition available on the open market after the Central Asian War and low firing cost has made it (and similar rifles) popular. It is widely used both as a target rifle and for medium-sized game hunting. There is no scope but one may be purchased.

Type:	7.5mm hunting rifle
Country:	France
Length:	102 cm
Action:	Single shot
Mass (empty):	3.0 kg
Ammunition:	7.5 x 40mm fixed cartridge ball
Muzzle Velocity:	910 mps
Magazine:	5-round box
Magazine Mass:	0.2 kg
RoF:	120 rpm

Kaskakaia Kodiak Hunting Rifle

Unlike most 7.5mm rifles, the Kodiak does not use the enormous stock of surplus 7.5 x 32mm or 7.5 x 40mm ammunition left over from the Central Asian War. Instead, it uses a match-grade custom 7.5x51 mm round developed by Kaskakaia for a military sniper rifle contract that fell through. The terminal characteristics of the Kodiak



Hunting Rifles	TL	Range	Damage	Kg	Cost	Magazine	Magazine Cost	Traits
Crossover, Rifle	10	400	3D	3.6	Lv650	5	Lv10	—
Crossover, Shotgun	—	80	4D	—	—	4	Lv2	—
Double Express	10	500	6D	4.9	Lv800	2	Lv10	Bulky
FC-68	9	200	3D-1	1.3	Lv720	70	Lv20	Auto 3
FC-70	10	400	3D	3.2	Lv650	5	Lv10	—
H900	10	500	4D	3.6	Lv900	5	Lv30	—
Kodiak	11	500	3D+2	3.2	Lv1100	5	Lv20	—
Kojote	10	200	3D-1	1.4	Lv200	9	Lv2	—

are excellent, making it a good choice for long-range hunting of medium-sized game. It does not come with a scope but one may be purchased, as it includes mounting rails to accommodate even military models.

Type:	7.5mm conventional rifle
Country:	United States
Length:	78 cm
Action:	Single shot
Mass (empty):	2.7 kg
Ammunition:	7.5 x 51mm match grade ball
Muzzle Velocity:	1,270 mps
Magazine:	5-round removable box magazine
Mass of five rounds:	0.5 kg
RoF:	60 rpm

DunArmCo H900 Thunder

Manufactured by DunArmCo, the H900 Thunder is used for big game hunting and occasionally pressed into service by police and militia forces as a sniper rifle. Over-penetration makes it unsuitable for hostage rescue, however. On the Frontier, it is widely used whenever large or dangerous local animals are likely to be encountered. It is nicknamed the 'Thunder from Down Under'.

Type:	11mm bolt-action hunting rifle
Country:	Australia
Length:	110 cm
Action:	Single shot bolt-action
Mass (empty):	3.1 kg
Ammunition:	11 x 68mm fixed cartridge ball
Muzzle Velocity:	1,100 mps
Magazine:	5-round removable box magazine
Mass of loaded magazine:	0.6 kg
RoF:	120 rpm

Stracher Double Express Rifle

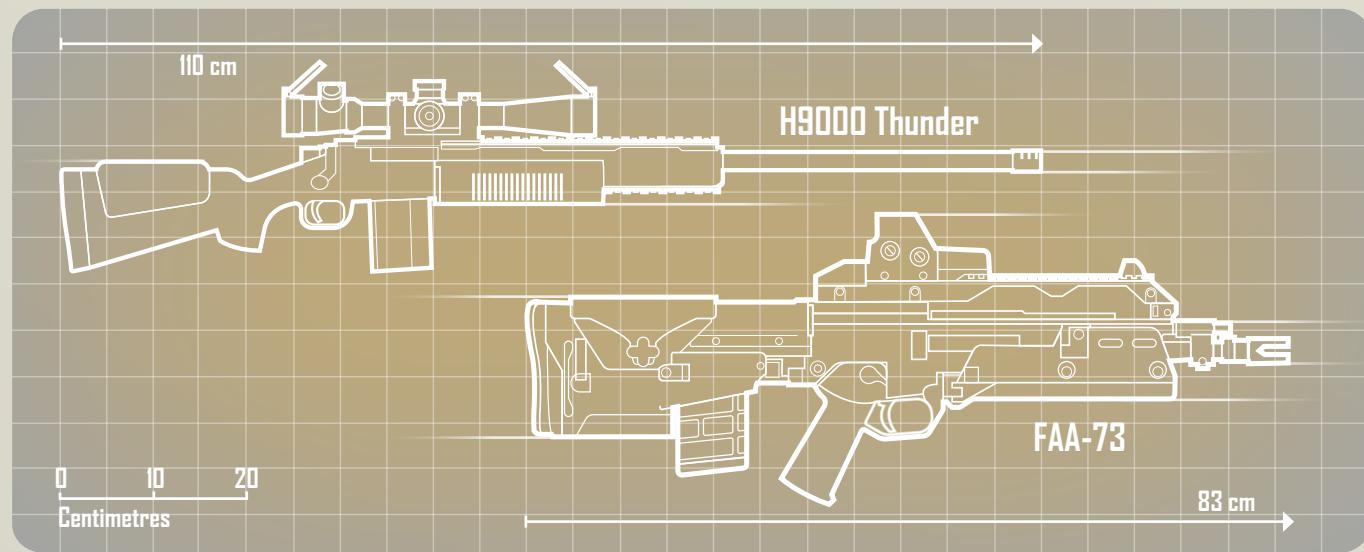
This is a heavy, double-barrelled rifle that fires a massive 14 x 120mm round while dampeners in the stock help cushion some of the recoil. The stock rifle is sold to colonists and explorers as a high-threat takedown weapon and has been used to some success against Beowulf dracoforms, even the heavily-armoured Cave Dragon. It is a basic weapon with polycarbonate stocks and a plain blued steel barrel.

Type:	14 mm double-barreled rifle
Country:	Austrovenia
Length:	112 cm
Action:	Single shot
Mass (empty):	4.9 kg
Ammunition:	14 x 120mm fixed cartridge ball
Muzzle Velocity:	1,370 mps
Magazine:	2 rounds
Mass of two rounds:	0.3 kg
RoF:	30 rpm

DunArmCo Crossover Rifle

DunArmCo's Crossover rifle/shotgun combination was originally marketed to police forces as an entry gun but has since found its niche as a general purpose gun in many colonial homes, especially on the American and Manchurian Arms. The low magazine capacity makes it acceptable to Manchurian authorities, while the versatility makes it popular for all users. It takes five rounds of rifle ammo in a box magazine forward of the trigger guard and four rounds of 18mm shotgun shells in a tube under the shotgun barrel. While it does not come equipped with a scope, it includes mounting rails.

It should be noted that while the standard box magazine for this rifle only holds five rounds, with very little work the 25-round magazine from the FAA-73 assault rifle will also fit the Crossover.



Type:	7.5mm rifle with 18mm pump-action shotgun
Country:	Australia
Length:	79 cm
Action:	Single shot
Mass (empty):	2.1 kg
Ammunition:	7.5 x 40mm fixed cartridge ball and 18 x 60mm fixed cartridge buckshot (9 x 8mm shot)
Muzzle Velocity:	1,100 mps for rifle, 410 mps for shotgun
Magazine:	5 round removable box magazine for rifle, 4 round internal tube magazine for shotgun
Mass of loaded rifle magazine:	0.4 kg
Mass of four shells:	0.3 kg
RoF:	80 rpm

SURPLUS MILITARY WEAPONS AND EQUIPMENT

Militia and colonial forces often have to make do with weapons and equipment cast off from the founding nation or older colonies. Much of this equipment is worn and old, at or near end-of-life. Skilled armourers are often employed to keep old weapons running properly, or even upgrade them. A common modification is to add a shotgun for close-in combat, or else a grenade launcher with range-fused grenades and a smart-sight. More often than not, although, grenade launchers are supplied on a squad level, using magazine-fed launchers.

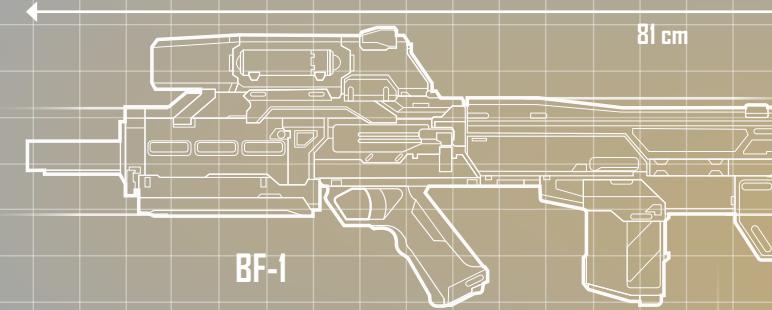
Assault Rifles

The primary weapon for battle, the effects of assault rifles can be devastating against unprepared targets.

FAA-73

Prior to the adoption of the FAM-90 gauss rifle, the FAA (Fusil Automatique d'Assault – 2273) was the standard French infantry rifle. It served during the Central Asian War and was regarded as a solid, if unremarkable, weapon. The lack of an integral grenade launcher was a major drawback, especially in the urban battles that characterised much of the middle phase of the war. The small magazine size was another factor that pushed the French military to search for a new weapon once the war was over. The FAA-73 rifle remains in service with colonial troops, many of whom have procured aftermarket magazines to solve the ammunition capacity problem. These non-standard issue magazines are available in 50 and 100-round configurations.

Type:	7.5mm rifle conventional assault rifle
Country:	France
Length:	83 cm
Action:	Single shot or bursts
Mass (empty):	3.0 kg
Ammunition:	7.5 x 40mm fixed cartridge ball
Muzzle Velocity:	910 mps
Magazine:	25 round removable box magazine (50 or 100-round also available, for Lv20 and Lv50 each)
Mass of loaded rifle magazine:	0.5 kg (1.1 kg for 50 round, 2.4 kg for 100-round drum mag)
RoF:	550 rpm



G-22

The Bavarian G-22 was an early binary propellant weapon that ultimately led to the Hanoverian SK-19. While the weapon's performance was good, reliability was consistently poor, which led to Bavaria ultimately adopting the less-advanced FAA-73 as their standard service weapon. Subsequent investigation revealed that the propellant gas mix in the trial weapons was sub-optimal and replacing it with a better mix substantially improved reliability and performance. By then, however, the Bavarian military had already placed their order for 8,000 FAA-73s and was not about to renege on the contract.

The 42 round magazine is loaded through the buttstock, while charging nozzles for propellant and oxidiser bottles are forward of the trigger guard.

Type:	7mm binary propellant assault rifle
Country:	Bavaria
Length:	83 cm
Action:	Single shot or bursts
Mass (empty):	2.3 kg
Ammunition:	7 x 22mm ball
Muzzle Velocity:	980 mps
Magazine:	42 round disposable box magazine, two gas bottles with enough propellant to fire 4 full magazines
Mass of loaded rifle magazine:	0.4 kg
Mass of propellant and oxidizer bottles:	0.4 g
RoF:	900 rpm



* Not to scale

Ramirez-Abrugg BF-1

The Ramirez-Abrugg BF-1 was the first commercially-successful binary-propellant assault rifle. Although it has been replaced in frontline service by more modern weapons, it still sees service with colonial militias and some police departments. Performance versus more modern weapons is lacking but they are available in large numbers and relatively inexpensive.

Type:	7.5mm binary propellant assault rifle
Country:	Brazil
Length:	81 cm
Action:	Single shot or bursts
Mass (empty):	3.5 kg
Ammunition:	7.5 x 11mm ball
Muzzle Velocity:	900 mps
Magazine:	40-round box magazine with separately loaded internal gas bottles
Magazine Mass:	0.3 kg
Recharge Bottle Mass:	0.3 kg
RoF:	550 rpm

Assault Rifles	TL	Range	Damage	Kg	Cost	Magazine	Magazine Cost	Traits
BF-1	10	300	3D	4.1	Lv200	40	Lv10	Auto 2, Scope
FAA-73	10	400	3D+3	3.5	Lv360	25	Lv10	Auto 2
G-22	11	400	3D	3.3	Lv1500	42	Lv15	AP 4, Auto 3, Scope

Submachineguns

Light, portable, but packing a real punch, submachineguns are an easy replacement for assault rifles in closer quarters.

Type-34

The Russian type 34 submachine gun was a popular weapon during the Central Asian War and became a sort of signature weapon for Spetsnatz troops operating in Kazakhstan and Uzbekistan. Using a 100-round helical magazine that forms the weapon's rear stock makes this a very compact, yet accurate weapon. Changing magazine is a bit more involved than with a more conventional weapon and it fell out of favour after the war.

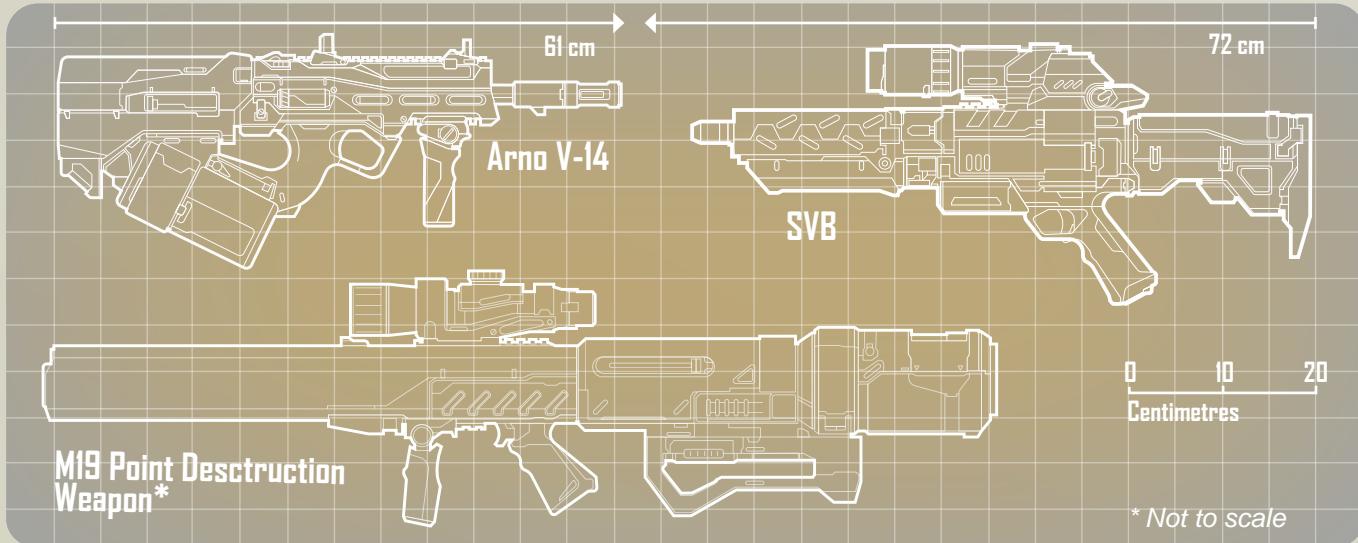
Type:	8 mm submachinegun
Country:	Russia
Length:	62 cm
Action:	Single shot or bursts
Mass (empty):	1.4 kg
Ammunition:	8 x 28mm fixed cartridge ball
Muzzle Velocity:	670 mps
Magazine:	100-round removable helical magazine
Mass of loaded magazine:	2.2 kg
RoF:	1,100 rpm

Arno V-14 Submachinegun

The Arno V-14 was initially developed for police forces but the unusual form-factor and light round made it unpopular with its intended market. However, the form-factor was a plus for militia, as the weapon is comfortable and easy to handle and the light ammunition is also inexpensive.

These weapons are found throughout the Latin Finger of the Manchurian Arm, in the hands of militia and, unfortunately, criminals. In particular, the terrorist group known as the Children of Mao use it as their 'official' weapon, favouring the high rate of fire and large magazine for attacks against civilian targets. The Children remove the flash hider and shorten the barrel right back to the body of the weapon.

Type:	5 mm submachinegun
Country:	Brazil
Length:	72 cm
Action:	Single shot or bursts
Mass (empty):	2.1 kg
Ammunition:	5 x 20mm fixed cartridge ball
Muzzle Velocity:	670 mps
Magazine:	100-round removable helical magazine
Mass of loaded magazine:	1.3 kg
RoF:	1,100 rpm



Submachineguns	TL	Range	Damage	Kg	Cost	Magazine	Magazine Cost	Traits
Type 34	10	25	3D-3	3.6	Lv1200	100	Lv15	—
V-14	10	20	2D	3.4	Lv400	50	Lv20	—

Energy Weapons

Very few energy weapons fall into surplus. Most are destroyed rather than made available on the open market. There are a few exceptions to this and most are in use by private military contractors (PMCs), another name for mercenary corporations. Some colonial militias use them too, although the costs of plasma cells are prohibitive.

M-19 Point Destruction Weapon

While the M-19 is technically a field-mount weapon, it can be fired by a single gunner using the weapon's integral monopod. The weapon system consists of a firing unit (sight, trigger and monopod) and a 375-megawatt photonic core plasma cell attached to the back of the firing unit. Once fired, the expended cell is discarded and another attached. Although capable of medium-range fire, the M-19 is considered a close-in defence weapon against vehicles since the pronounced flash and backblast invariably expose the gunner's position.

Type:	Field-mounted 375-megawatt plasma gun
Country:	USA
Length (exclusive of plaser cell):	163 cm, 224 cm when loaded
Action:	Single shot
Mass (empty):	14 kg
Ammunition:	270 x 844mm 375-megawatt photonic core plasma cell
Ammunition Mass:	15 kg
Magazine:	1 cell attached to rear of weapon
RoF:	3 rpm

SVB (Snayperskaya Vintovka Belnikarpova)

Although the Belnikarpova is technically the highest-energy human-portable laser in service with any army, more modern designs produce the same damage at

lower power levels. Nonetheless, the SVB remains effective and is the standard service laser in use by Russia, where it is the squad-issue sniper weapon.

Type:	120-01 laser rifle
Country:	Russia
Length:	83 cm
Action:	Single shot
Mass (empty):	2 kg
Pulse Energy:	0.8 megajoules
Muzzle Velocity:	C
Magazine:	6 MJ FDLMS cell (6 pulses)
Magazine Mass:	1 kg
RoF:	120 rpm

Anti-Armour Weapons and Grenade Launchers

The modern battlefield contains many threats. While main battle tanks are not as common as they once were, lighter armour and combat walkers have filled the gap. While these systems are virtually immune to small arms, their lighter armour has seen a resurgence in interest in light anti-armour weapons. While not effective against true tanks, these weapons are very dangerous to lighter machines.

RPG-90

Designed by the Segetov Group but license-built all over human space, the RPG-90 is a very basic anti-tank rocket launcher, used to good effect by partisan forces against both the Manchurians, the French, and their allies (including, ironically, Russians) during the Central Asian War. Militia and insurgent tactics often emphasise the RPG as the primary weapon of a fire team, with other weapons to provide covering fire.

The RPG-90 uses a small caseless charge to propel the rocket out of the launcher, with stabilising fins deploying as it exits. The rocket motor ignites about six metres downrange and propels the warhead to the target.

Energy Weapons	TL	Range	Damage	Kg	Cost	Magazine	Magazine Cost	Traits
M-19	11	250	1DD	3.0	Lv2850	1	Lv650	AP 20, Blast 2, Bulky
SVB	11	500	5D	3.0	Lv2300	6	Lv15	Scope, Zero-G

Type:	90mm rocket launcher
Country:	Russia
Length:	80 cm for launcher, 115 cm when loaded
Action:	Single shot
Mass (empty):	5.8 kg
Ammunition:	90mm x 45cm rocket with HEAT warhead
Muzzle Velocity:	350 mps
Magazine:	Single shot
Mass of Single Round:	2.6 kg
RoF:	10 rpm

Stahlhammer Disposable Rocket Launcher

The Stahlhammer is a Freihafen design adopted shortly after the War of German Reunification and Freihafen's declaration of independence. While Freihafen was a major industrial centre for Germany, the old German government carefully controlled the supply of weaponry to its oldest colony. The Stahlhammer was developed as a stopgap anti-armour weapon until Freihafen could develop or purchase more sophisticated weapons.

With the development of the Mjolnir shoulder-fired missile launcher, the Stahlhammer was declared surplus and hundreds of them found their way onto the international market.

Type:	80mm Disposable Rocket Launcher
Country:	Germany
Length:	60 cm for launcher in storage mode, 90 cm extended
Action:	Single shot
Mass (loaded):	3.2 kg
Ammunition:	80mm x 55cm rocket with HEAT warhead
Muzzle Velocity:	320 mps
Magazine:	1 rocket
RoF:	—

Carl-Gustav M45 Recoilless Rifle

For many years, the standard light anti-armour weapon of the Scandinavian Union was the Carl Gustav M45, produced by the member-state of Sweden. This very robust weapon can operate under just about any conditions and can be equipped with a guided warhead that makes small course corrections to home in on the light from a laser designator. It is not in any sense a

rocket or missile launcher, as all propellant is burned before the warhead leaves the rifled tube. It produces a dangerous back-blast (3D damage) within a ten-metre cone of the rear of the weapon.

While the M45 is not used by any military in the Core, it is common in colonial militias and Frontier units. Some mercenaries also use these weapons in anti-personnel and anti-fortification roles.

Type:	80mm recoilless rifle
Country:	Scandinavian Union
Length:	97 cm
Action:	Single shot
Mass (loaded):	5.5 kg
Ammunition:	80 x 200mm HEAT round
Muzzle Velocity:	340 mps
Magazine:	Single Shot
Mass of one round:	2.5 kg
RoF:	10 rpm

DunArmCo GR-10

Magazine-Fed Grenade Launcher

This 10-shot grenade launcher uses standard 30mm propelled grenades, loaded forward of the trigger guard in a large, double-stacked box magazine. A Traveller can select which side of the magazine to feed from, allowing a mix of grenade types, like conventional HE for anti-personnel work and HEAP for anti-armour.

Type:	30mm grenade launcher
Country:	Austrovenia
Length:	84 cm
Action:	Single shot
Mass (empty):	2 kg
Ammunition:	30mm propelled grenade
Muzzle Velocity:	320 mps
Magazine:	10 rounds
Mass of Magazine:	2.1 kg
RoF:	30 rpm

Stracher Faustus CD Gas/Baton Launcher

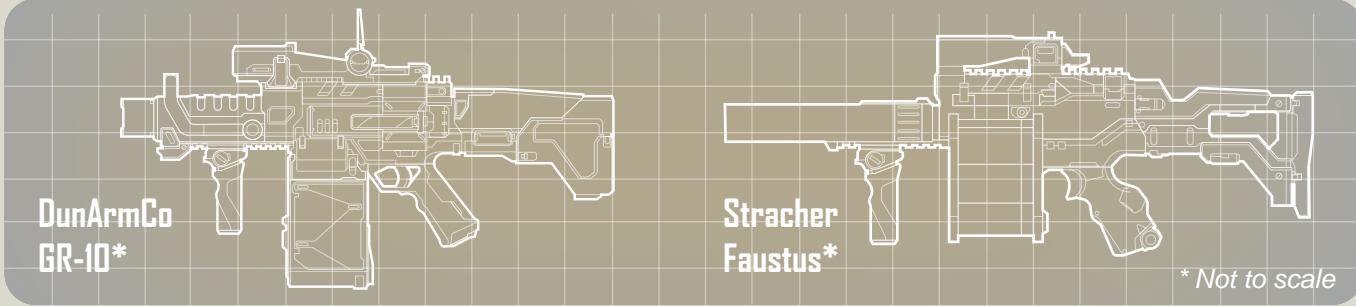
Although typically found in the armories of colonial police forces, these weapons are seldom issued. On the rare occasions where a colony has a mass civil disturbance, it is more likely that the mother country will send military forces. This five-shot grenade launcher uses 27 mm rounds, which are both narrower and longer than standard propelled grenades, making it incompatible with military grenade ammunition.

The rounds are loaded in a five-shot rotary magazine, allowing the user to select which round to fire with a thumb switch.

Type:	27mm grenade launcher
Country:	Austrovenia
Length:	84 cm
Action:	Single shot
Mass (empty):	2.6 kg
Ammunition:	27mm propelled grenade
Muzzle Velocity:	250 mps
Magazine:	5 rounds
Mass of five rounds:	1.5 kg
RoF:	30 rpm

As the Faustus is incompatible with conventional 30 mm grenades, the most commonly available rounds are CD (Crowd Dispersal) Gas, Rubber Batons and Shock Batons.

Some Frontier manufacturers have started to make military grade ammunition for the Faustus, allowing it to be used by local militias as an ersatz grenade launcher. So far, only conventional HE (High Explosive) is available but High Explosive Armour Piercing (HEAP) grenades are likely on the way.



Anti-Armour Weapons and Grenade Launchers

Weapon	TL	Range	Damage	Kg	Cost	Magazine	Magazine Cost	Traits
RPG-90	10	300	6D	8.4	Lv500	1	Lv60	AP 15
Stahlhammer	10	300	6D	3.2	Lv600	1	—	AP 10
M45	10	500	6D	8	Lv900	1	Lv120	AP 20, Scope
GR-10	9	200	Varies	4.1	Lv1200	10	Varies	—
Faustus	9	100	Varies	4.8	Lv950	5	Varies	Scope

Stracher Faustus CD Gas/Baton Launcher

Ammunition	TL	Range	Damage	Kg	Cost	Magazine	Magazine Cost	Traits
CD Gas	9	—	Special	0.1	Lv10	—	—	Blast 8, Stun
Rubber Baton	9	—	3D	0.1	Lv12	—	—	Stun
Shock Baton	9	—	4D	0.1	Lv20	—	—	Stun
HE (after market)	9	—	3D	0.1	Lv30	—	—	Blast 4

POLICE WEAPONS

With the advent of stun weapons, police are rarely required to resort to lethal force. If anything, the widespread use of non-lethal weapons has given police forces an attitude of 'shoot first, ask questions later'. In many jurisdictions, the only limit on this use of non-lethal force is the requirement for them to identify themselves as police officers before opening fire.

Most police officers will carry another weapon as a backup, however, sonic stunners are not 100% effective, and some can shrug off the effects. Stunners also have a short effective range. It is possible to protect oneself from the effects of a sonic weapon, so police forces need an alternative, which is typically a shotgun or large calibre handgun. It is worth noting that neural disruptors, which are extremely rare on the Frontier, are 100% effective against unmodified nervous systems.

Less-Lethal Weapons

While normally this category of weapon is non-lethal, on very rare occasions an individual with some pre-existing conditions may die. Neural weapons are more prone to this than sonic weapons but both can be hazardous, while electrical weapons like stun sticks and puke sticks are even more dangerous.

* Not to scale

Sonic Weapons

Sonic stunners project focused sound energy, usually in the ultrahigh frequency range, with sufficient energy to stun the target. They are only effective in atmospheres and against targets not wearing heavy armour (particularly airtight armoured helmets). As a result of these limitations and the fact that sonic bursts merely stun an opponent, they are of limited combat value. However, they are highly effective, non-lethal control weapons and used extensively by police and security forces. Sonic weapons can be used underwater, where they have their ranges and damages doubled.

Brandt Audionique AS-3

This sonic stunner is often used by police and security guards. Like the P-3 laser pistol, the power pack is separate, carried on the belt beside the weapon's holster.

Type:	Sonic stun pistol
Country:	France
Length:	47 cm
Action:	Single shot
Mass (empty):	2 kg
Muzzle Velocity:	Local speed of sound
Magazine:	5MJ LMS cell (40 pulses)
Battery Mass:	0.5 kg
RoF:	130 rpm

Quinn Optronics Restraint Carbine

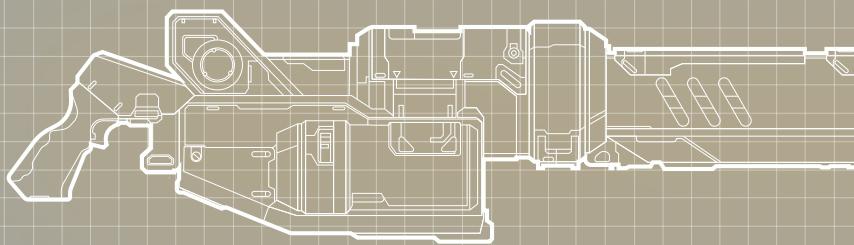
The heavier restraint carbine is used for high-risk situations where its greater power overrides its more cumbersome size.

Type:	Sonic stun police carbine
Country:	America
Length:	73 cm
Action:	Single shot
Mass (empty):	4 kg
Muzzle Velocity:	Local speed of sound
Magazine:	5MJ LMS cell (15 pulses)
Battery Mass:	1 kg
RoF:	300 rpm

Darlan M9 Wide Area Sonic Stunner (WASS)

Typically a vehicle-mounted device, the WASS is a sonic weapon capable of blanketing a large area very rapidly. It is often used in crowd control and high-risk situations like hostage-taking.

Type:	Sonic stun cannon
Country:	France
Length:	172 cm
Action:	Single shot or bursts
Mass (empty):	53 kg
Muzzle Velocity:	Local speed of sound
Magazine:	External fuel cell with power for 300 shots
Fuel Cell Mass:	20 kg
RoF:	600 rpm



WASS*

* Not to scale

Sonic Weapons	TL	Range	Damage	Kg	Cost	Magazine	Magazine Cost	Traits
AS-3	10	25	3D-3	3.6	Lv1200	100	Lv15	Stun
Restraint Carbine	10	25	3D	3.6	Lv1200	100	Lv15	Stun
M9 WASS	11	100	3D	3.6	Lv6000	300	Lv150	Blast 8, Stun
Sick Stick	11	Melee	4D	1	Lv550	30	Lv40	Stun
Shock Baton	9	Melee	3D	1	Lv320	50	Lv25	Stun
Shock Glove	10	Melee	3D	0.4	Lv250	10	Lv150	Stun

Sick Stick

The sick stick is a prisoner/riot control device. When it hits, or even touches, a target, a specially modulated pulse of electricity is sent into the victim, making them nauseated and often violently ill. Most people are not capable of putting up a great deal of resistance if they are vomiting their guts out.

Shock Baton

Designed for police and prison work, short versions of these weapons are favoured by muggers and thieves. If used unpowered, the baton can still deliver 2D damage.

Shock Glove

Shock gloves have much the same effect as the baton but are more likely to be used by security guards and the military, not to mention the underworld.



ORBITAL WEAPONS

Orbital weapons are designed for use in space habitats and on the surfaces of airless moons. Key design considerations are low recoil, vacuum-hardening and limited penetration. Most stations and small surface structures only have walls just thick enough to hold in atmosphere. Thicker walls, especially metallic walls, are more of a hazard due to radiation spalling events. Preventing weapons from puncturing station walls is very important. Unless, of course, mass-murder is your goal.

DunArmCo L-80 Dart Gun

While DunArmco terms the L-80 a 'Dart Gun', to make it sound innocuous, it is still a dangerous weapon. It fires frangible flechettes at moderate velocity, optimised for damage against soft targets. The frangible flechettes will break apart and cause significant damage in flesh but will break up if they impact anything more substantial, like spacecraft hulls, aircraft walls or rigid piping.

Type:	3.5mm flechette
Country:	Australia
Length:	84 cm
Action:	Single shot
Mass (empty):	0.9 kg
Ammunition:	3.5 x 25mm fin-stabilised frangible flechettes
Muzzle Velocity:	310 mps
Magazine:	25 rounds
Mass of Magazine:	0.8 kg
RoF:	30 rpm

Orbital Weapons	TL	Range	Damage	Kg	Cost	Magazine	Magazine Cost	Traits
ASW-2	12	20	4D	2	Lv2400	6	Lv20	Stun
GS-4	10	200	3D+1	2.3	Lv500	20	Lv15	Auto 4, Scope, Zero-G
Gyro Pistol	10	50	3D	—	Lv300	12	Lv24	Zero-G
L-80 Dart Gun	10	20	2D	3.6	Lv750	25	Lv13	Frangible, Zero-G
TR-9	11	25	4D	2.8	Lv950	9	Lv45	AP5, Red Dot

Arno K-17 'Komet' Rocket Pistol

Commonly known as gyrojet pistol, rocket pistols are a lightweight design that fire spin-stabilized rockets in place of normal bullets. Since the barrel pressure is low, and the barrels are not rifled, they can be simple high-temperature synthetic materials. The rocket round has next to no recoil and is quite accurate over long ranges. The rocket round takes a bit of time to attain full speed, as it is still accelerating when it leaves the barrel. Shots at Close range only cause 2D damage but by Effective range the round is at maximum velocity.

Type:	11mm rocket pistol
Country:	Argentina
Length:	41 cm
Action:	Single shot
Mass (empty):	0.8 kg
Ammunition:	11 x 30mm spin-stabilised rocket
Muzzle Velocity:	250 mps
Magazine:	12 rounds
Mass of Magazine:	0.5 kg
RoF:	30 rpm

Stracher GS-4 Rocket (Gyro-jet) Carbine

The Stracher GS-4 is a compact bull-pup carbine, capable of semi-auto or full-auto fire. It or similar models are widely used by marines and other protected forces troops when operating in more open environments where the long range of the rocket can be utilised to its full potential. The rocket round takes a bit of time to attain full speed, as it is still accelerating when it leaves the barrel. Shots at Close range only cause 2D+1 damage but by Effective range the round is at maximum velocity.

Type:	12mm rocket carbine
Country:	Austrovenia
Length:	71 cm
Action:	Single shot or bursts
Mass (empty):	1.2 kg
Ammunition:	12 x 40mm spin-stabilised rocket
Muzzle Velocity:	250 mps
Magazine:	20 rounds
Mass of Magazine:	1.1 kg
RoF:	450 rpm

DunArmCo TR-9 Shipboard Security Weapon ('Nail Gun')

The so-called 'nail gun' fires a rather unusual round. As noted previously, puncturing of station and habitat walls is generally something to be avoided. As a result, most weapons designed for use in space limit their penetration, the most common way being frangible rounds. However, the poor penetration is of limited use against armoured opponents, like in a boarding action. DunArmCo developed the TR-9 in response to an Australian Space Force for lethal shipboard security weapons. While other proponents offered overly-complex weapons with 'smart' bullets that would be able to sense if they were impacting an armoured suit or a station wall, DunArmCo studied space station and ship construction.

In their research, they discovered that most ship and station walls are 30–35 centimetres thick, plus any armour. The average distance between the exterior of an armoured suit and vital organs of the wearer is 20 centimetres.

DunArmCo developed a high-velocity round that could punch most armoured suits but not the outer skin of a ship or station. The round consists of a long penetrator, approximately 22.8 centimetres long, with a two centimetres wide baseplate with an impact-activated layer of sealant. This unusual round is wrapped in a frangible sheath, which allows the round to be spin-stabilised. The sheath shatters when the round impacts a hard target, and the baseplate prevents the round from penetrating more than 22.8 centimetres of material. If it hits a suit, the round will penetrate the suit and the wearer's body, then stop, leaving the long spike embedded in the target. This can cause serious secondary wounds if the target should move more than a minimal amount. NARL has started a campaign against the use of the TR-9, calling it cruel and inhumane.

Type:	20 mm Shipboard Security Weapon
Country:	Australia
Length:	68 cm
Action:	Single shot
Mass (empty):	1.8 kg
Ammunition:	20mm frangible-cased base-limited flechette
Muzzle Velocity:	250 mps
Magazine:	9 round detachable box magazine
Mass of Magazine:	1 kg
RoF:	30 rpm

Quinn-Darlan ASW-2 Neural Disruptor

If a neural disrupter is seen on a Frontier world, it is almost always in the hands of a Core world agent. These weapons are extremely rare on the Frontier, rare enough that one can never be purchased except through the black market. A hit from a neural disrupter will knock the target unconscious for 2D minutes and they will wake up with a blinding headache (DM-3 to all actions) that lasts for 1D hours. The only defence is a rewired nervous system, like neural sheathing or the King and Merman DNA modifications

Type:	Voigt-effect Neural Disruptor
Country:	France/United States
Length:	27 cm
Action:	Single shot
Mass (empty):	1.4 kg
Muzzle Velocity:	C
Magazine:	12 MJ HDLMS cell, with power for 6 shots
Mass of Loaded Magazine:	0.6 kg
RoF:	40 rpm

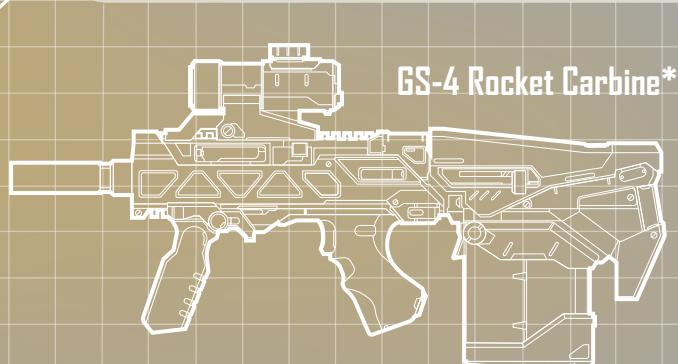


SAMPLE SERVICE-DUTY ASSAULT RIFLES AND WEAPON SYSTEMS

American Hyde Dynamics M4 Gauss Assault Rifle

The M4 gauss rifle was developed for the use of American marines serving alongside their French counterparts in joint operations. It has a fair degree of parts and electronics compatibility with the FAM-90 and makes use of the same magazine/powerpack combination. In other service branches the binary propellant M-5 is expected to remain in service for the foreseeable future. One of the unique features of the M-5 is the grenade launcher, which uses two three-round magazines, allowing the operator to switch between grenade types in combat (Minor Action to switch). Unlike the French weapon, the M4 has a full-auto function, but it lacks the tight 4-round burst. The included optical sights incorporate a red-dot, telescopic zoom, and ranging and programming options.

Type:	4.5mm gauss assault rifle (with 30mm grenade launcher)
Country:	US
Length:	78 cm
Action:	Single shot or bursts
Mass (empty):	5.1 kg
Ammunition:	4.5 x 25mm flechette APHE
Muzzle Velocity:	1,600 mps
Magazine:	80-round box magazine with integral power supply
Magazine Mass:	0.5 kg
RoF:	1,200 rpm
Features:	30mm integral grenade launcher



* Not to scale

Service-Duty Weapons	TL	Range	Damage	Kg	Cost	Magazine	Magazine Cost	Traits
GRGL-30	11	1,000	Varies	27	Lv12000	50	Varies	Auto 4
M-4	12	400	4D	5.8	Lv1500	20	Lv30	AP 5, Auto 6
Grenade Launcher	12	300	Varies	—	—	6	—	—
M-5	12	400	4D	4.8	Lv1500	20	Lv30	AP 5, Auto 6
Gas Bottle	12	—	—	0.1	Lv100	600	—	—
L-120	12	200	4D	7.3	Lv11000	300	Lv180	Auto 4, Zero-G
Battery Pack	12	—	—	15	Lv165	—	—	—
Fuel Cell	12	—	—	180	Lv2100	—	—	—
Libertine Laser	12	400	4D	2.4	Lv1800	20	Lv20	Scope, Zero-G
RG-54	12	500	3D	30	Lv50000	5,000	Lv200	Auto 4
Type 720	11	600	3D+2	10	Lv2100	150/50	Lv100/Lv35	Auto 6

Traylor Arms M-5 Assault Rifle

The M-5 assault rifle is a progressive development of the M-2 assault rifle, combining the shattering power of the 9mm APHE round with the high-capacity magazines afforded by binary propellant. The M-5 beat the SK-19 into service, although the German design is usually considered to be superior.

Type:	9mm binary propellant assault rifle (with 30mm grenade launcher)
Country:	US
Length:	79 cm
Action:	Single shot or bursts
Mass (empty):	4.2 kg
Ammunition:	9 x 12mm APHE
Muzzle Velocity:	700 mps (area fire 400 mps)
Magazine:	50 rounds with propellant gas bottle. Catalyst gas bottle with charge for 600 aimed shots or 200 bursts.
Magazine Mass:	0.5 kg
Recharge Bottle	0.1 kg
Mass:	
RoF:	900 rpm
Features:	30mm integral grenade launcher

Royal Armouries L-120 Combat Laser

The L-120 combat laser is a new design developed for the Royal Space Marines. Their operations against Belters in the Queen Alice's star system convinced them of the need for a zero-G support weapon. It is the only frontline laser weapon in service with three lasing systems, allowing it to attain a comparatively high rate of fire. This comes at a cost in power requirements however, requiring the operator to either have a heavy

battery backpack, or be equipped with a fuel cell and an HPG (homo-polar generator) to produce the power spikes required.

Type:	35-01 rapid pulse combat laser
Country:	Britain
Length:	85 cm
Action:	Single shot or bursts
Mass (empty):	7.3 kg
Muzzle Velocity:	C
Magazine:	120 MJ FDLMS backpack (300 pulses) 1.2 MW fuel cell (3,000 pulses)
Magazine Mass:	15 kg (backpack), 180 kg (fuel cell)
RoF:	600 rpm

Libertine Laser

The Libertine traders have long learned to trust very few outside of their families and clans, and do not tend to look to local law enforcement to protect them. That is where the so-called 'Libertine Laser' comes from, the need to protect themselves without involving anyone from the outside.

The Libertine Laser is a short, carbine-style weapon that can be easily manufactured by black-market industrial fabricators, save for the lasing mechanism itself. That comes from a Libertine autofactory on Baxtalo Station and they are shipped widely to Libertines on all three Arms.

Of course, it is inevitable that these weapons would find their way on to the planetary black markets and into the hands of criminals and terrorists, especially given the untraceable nature of most of the components. The following is one example of a Libertine Laser.

Aside from the lasing mechanism, they vary widely from family-to-family and ship-to-ship. There are reportedly models that using multiple lasing assemblies for a higher rate of fire, for example.

Type:	50-01 laser rifle
Country:	Libertines
Length:	65 cm
Action:	Single shot
Mass (empty):	1.4 kg
Pulse Energy:	0.5 megajoules
Muzzle Velocity:	C
Magazine:	10 MJ FDLMS cell (20 pulses)
Magazine Mass:	1 kg
RoF:	100 rpm

Kasaskaia Arms Type 720 Machinegun

Designed as a domestic American machinegun, it was adopted after modifications by the Marines in 2289. It is similar in most respects to the Manchurian Type 381, although slightly heavier, longer and more durable.

Type:	7.5mm squad machinegun
Country:	U.S.
Length:	130 cm
Action:	single shots or bursts
Mass (empty):	8 kg
Ammunition:	7.5 x 32mm fixed cartridge ball
Muzzle Velocity:	940 mps
Magazine:	150-round cassette or 50- round magazine
Magazine Mass (cassette):	2 kg
Magazine Mass (50-round magazine):	0.8 kg
RoF:	900 rpm

Krupp RG-54 Machinegun Autoturret

The RG-54 autoturret is an autonomic weapon used in a defensive role. It uses a combination of image recognition and IFF (Identify Friend or Foe) technologies to reliably shoot hostiles in a crowd of friendlies. At least, those are the claims made by the manufacturer. There are no reliable reports of this having actually been attempted in real-world situations, though it does work well in testing.

The RG-54 is equipped with a Rheinmetall L50 machinegun, a lightweight weapon that uses the same binary ammunition as the SK-19 assault weapon. The

weapon mount is modular, however, allowing a customer to adapt the system to virtually any weapon of a similar size.

The RG-54 can be operated as a remote weapon, using the Remote Operations skill. If left in autonomous mode, it has the following characteristics. Gun Combat: 2, Recon 1, Tactics (military) 2, 24 hour power supply. Equipped with low-light and IR sensors.

Type:	5.5mm Autonomous Machinegun
Country:	Germany
Length:	120 cm
Action:	single shots or bursts
Mass (empty):	24 kg
Ammunition:	5.5 x 40mm fixed cartridge ball
Muzzle Velocity:	1,200 mps
Magazine:	500-round cassette
Magazine Mass (cassette):	6 kg
RoF:	750 rpm

RGL-30 Automatic Grenade Launcher

The RGL-30 is a fully-automatic grenade launcher that is often found mounted on vehicles and in static emplacements. While the complete weapon can be moved by a crew of three, it cannot be fired while being moved this way. One crew carries the weapon, another the ammunition cassette and the last the heavy tripod that allows it to be stably fired.

The RGL-30 uses special high-powered grenades for greater range. These grenades cannot be used in conventional launchers. The RGL-30 can make use of standard 30mm propelled grenades but they must be loaded individually.

Type:	30mm Automatic Grenade Launcher
Country:	France
Length:	140 cm
Action:	Single shots or bursts
Mass (empty):	12 kg
Ammunition:	30 x 60mm propelled grenade
Muzzle Velocity:	800 mps
Magazine:	50-round cassette
Magazine Mass (cassette):	15 kg
RoF:	600 rpm

BODY ARMOUR

Surplus body armour is often available to colonial customers, either for local police or militia forces, or else as protective clothing for colonists in dangerous conditions. Custom-made armour is typically not available and modern armour-cloth materials are difficult to modify.

Surplus Vest

The vest is made from standard non-rigid ballistic cloth and despite being surplus is usually still in good condition. When they wear body armour, colonial police forces will wear the surplus vest.

Surplus Non-rigid Body Suit

This full-body suit made from ballistic cloth is standard for better-equipped colonial militias and provides decent overall protection. The suit is lined with a moisture-wicking layer to keep the wearer cool and several pockets all over the suit provide storage for miscellaneous items.

Vedette Half-Armour

The vedette half-armour is not a standard issue item in most militias but many members will purchase one themselves to provide that extra bit of protection.

Surplus 2245-pattern Helmet

While superseded in modern French inventories by the 2290-pattern helmet, the 2245-pattern served the French military well throughout the turbulent years of the Central Asian War. As a surplus item, the communicator has been removed but a replacement can be fitted for Lv20.

Riot Gear

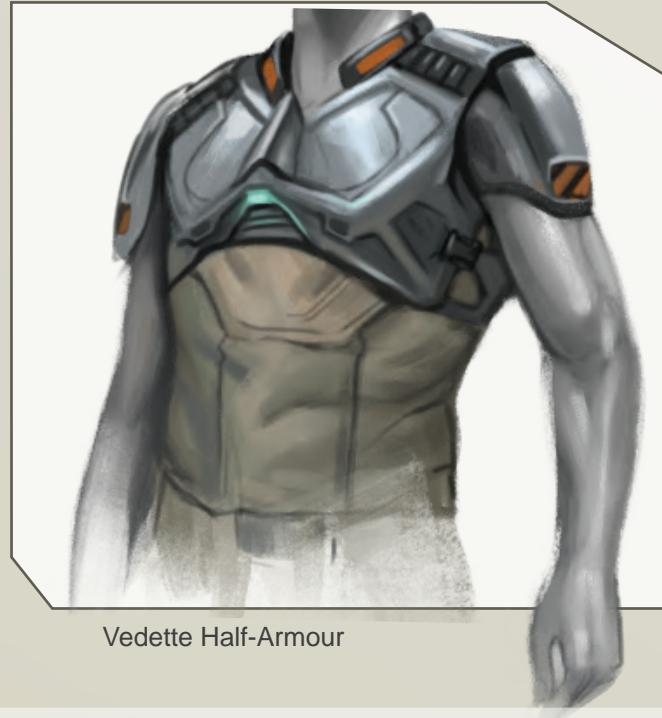
Many colonial police stations come equipped with riot gear but few Frontier peace officers outside of Vogelheim, Crater and Dukou have had to make use

of them. Riot gear is designed to be intimidating, while providing very good protection from the front arc. It comes equipped with a helmet with full-face shield and a limited life-support system to protect against chemical agents, fumes and fire. This life support is only good for 15 minutes. The armour protects equally well against gunfire, blunt impacts, sharp edges or points, and fire, although it is heavy and fatiguing to wear.

It is very obviously armour, which is the point. Riot gear has DM-2 to Availability for purchase by civilians.

Riot Shield

This 1.8 metre tall clear plexane shield can be rendered completely opaque at the touch of a switch. A Traveller using this shield increases their effective Melee skill by +1 when parrying. A Traveller with no Melee skill counts as having Melee 0 when using it to parry. It also provides Protection +4 against all attacks made from the front.



Vedette Half-Armour

Body Armour

Armour Type	Protection	TL	Rad	Kg	Cost	Required Skill
Riot Gear	+8	11	—	15	Lv2000	None
Riot Shield	—	11	—	4.5	Lv500	None
Shock Armour	+5	12	—	5	Lv4000	None
Surplus 2245-pattern Helmet	+7	11	—	3	Lv50	None
Surplus	+5	7	—	4	Lv250	None
Surplus Non-rigid Body Suit	+7	10	—	10	Lv450	None
Vedette Half-Armour	+2	9	—	2	Lv600	None

Armour

Armour Type	Protection	TL	Rad	Kg	Cost	Required Skill
EOD Armour	+24	11	100	20	Lv8000	None
MEC Ballistic Barrier	+18	11	—	50	Lv12000	None
MEC Deployable Ballistic Shield	+12	11	—	9	Lv1100	None

Shock Armour

The ultimate in riot and prisoner control gear, shock armour is rare on the Frontier. It is an electrically-insulated suit of ballistic-cloth armour with a weave of wires through the surface. When the suit is live, anyone touching it will suffer 3D6 damage with the Stun trait. The battery in the suit can provide enough power for 50 'shots' before needing to be replaced. Most officers using these suits for riot control carry another three to four batteries with them.

ARMOUR

While not in common use, there are other varieties of armoured protective gear available for special circumstances.

Explosive Ordnance Disposal Armour

While robots and drones are the preferred (and safest) means of dealing with armed but undetonated explosive devices, there is occasionally need for a human expert to be on scene. EOD armour is very bulky and restrictive, save in the lower arms and hands. This maximises the protective value while still giving the wearer the best possible fine motor control of their fingers, the primary reason for employing a human operative in the first place.

Most suits incorporate a set of cameras and lights at the wrists to give the operator a better view of what they are doing, along with high-bandwidth audio-visual transmissions to a base station where others can provide advice and support.

In the event of an unplanned detonation, the armour will likely save the occupant, although they are very likely to lose one or even both hands at the wrist. The suits are equipped with automatic tourniquet collars just above each wrist in case this happens.

The heavy, bulky EOD armour slows the user down by two metres per round and imparts a DM-2 to all skill checks save those requiring fine motor skills in the hands, which are almost entirely bare of armour.

MEC Deployable Ballistic Shield

The deployable ballistic shield is a heavy composite shield that comes in three sections plus the floorplate. The floorplate is put down first and the user steps on it while they pull up the other three sections, which snap together. The shield is only large enough for a single person to shelter behind it and it is awkward to move, despite the rollers on the base. It includes a cut-out with a rest to allow a long-arm to be fired single-handed. Deploying the shield takes two Minor Actions; it is designed to be deployed quickly. However, folding it back up again takes 1D combat rounds. While intended to be used by assault forces, the mass and limited mobility make it more useful in a defensive role.

The MEC shield provides Cover for the user and they can also hide completely behind to gain the benefit of its added Protection.

MEC Ballistic Barrier

The ballistic barrier is used to provide defensive cover for police and military units. The barrier is normally carried on a vehicle due to its mass but using a walker to carry and set it up is becoming common, especially in the Core. A standard section of barrier consists of five 1.2 metre tall by two metre sections that slide out and lock together, forming a 10 metre wide barrier. Each panel has a pair of braces that swing down to support it and these braces can be anchored to a hard surface with the integral explosive bolts. Each panel requires one Minor action to deploy and up to three people can assist each other in deploying it.

Like the MEC ballistic shield, the barrier can provide Cover or loan its Protection value to anyone hiding behind it.

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