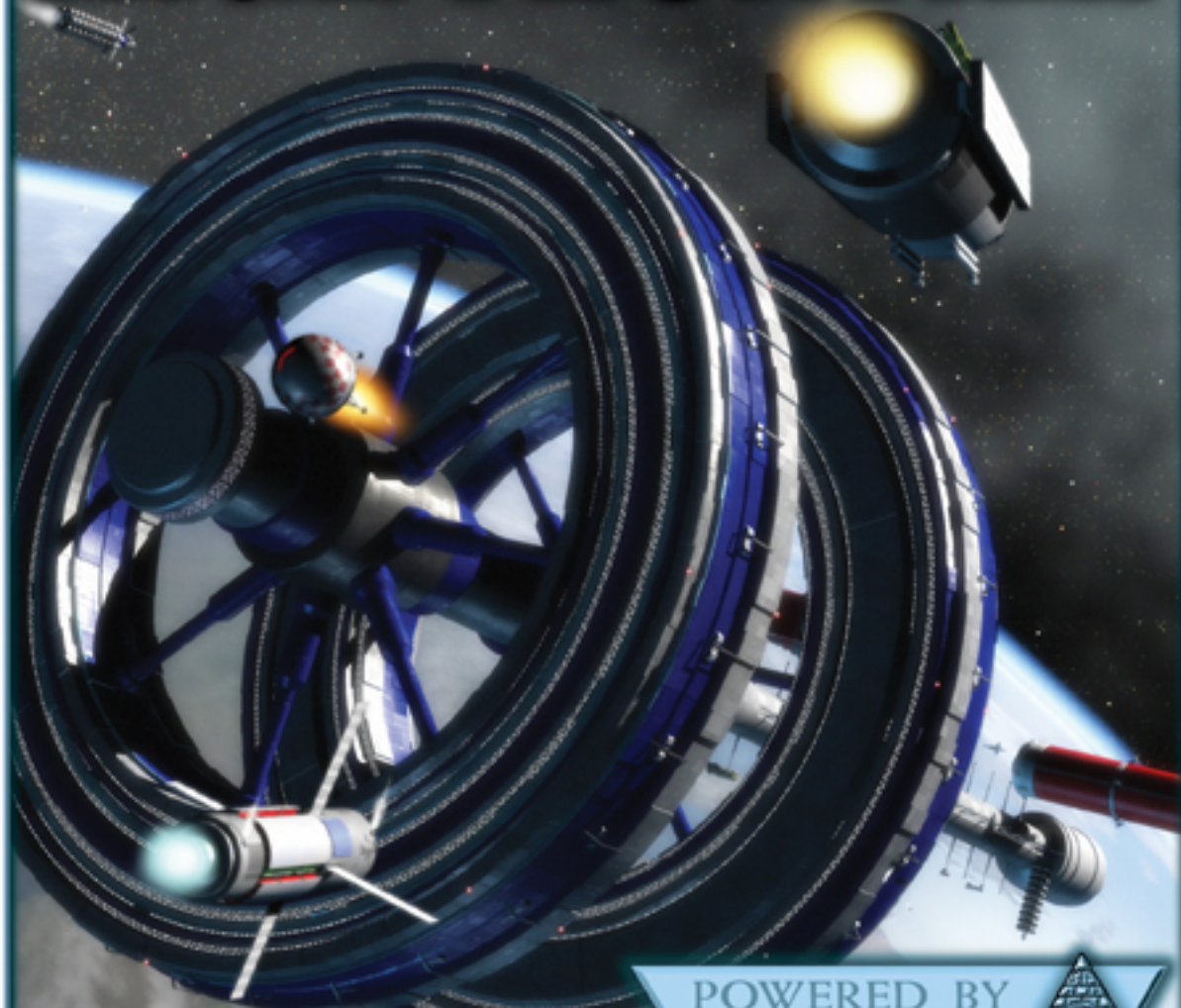


TransHumanTM SPACE

HIGH FRONTIERTM



Compiled by David Pulver

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GURPS Transhuman Space: High Frontier **Playtest Files**

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2 Earth Orbit

Without a doubt, Earth orbit boasts the busiest, and perhaps most interesting, portion of space in the solar system. It's a bustling, frantic place. Earth is only a \$10,000 ticket and a few hours flight away by space plane. Consequently, it is a frequent stopover point for travelers headed into the well or the deep beyond. Home to a dizzying collection of nations and corporations, Earth orbit presents numerous opportunities to experience the richness and diversity of the early 22nd century.

It's also a tense place. The military satellites and defense stations of powers great and small can be found here. Less than two decades ago, the Pacific War spilled over into orbit, leading to a brushfire conflict whose effects can still be felt today. Now, orbital groups eye one another warily, creating an environment ripe for espionage and demanding the presence of regulatory agencies.

This chapter describes the major facilities, personalities, and rivalries that exist in Earth orbit. Its primary focus is on the politics of the region, not only as they relate to one another, but also as they relate to the Earth and the Moon. Earth orbit is where the great powers of the solar system -- whether political, military, or corporate -- wage proxy wars against one another. Spies, terrorists, and security units work behind the scenes to ensure the success of their agendas, while bystanders hope not to be caught in the inevitable crossfire. The chapter likewise details the military forces in orbit, as well as their strategies and tactics.

In addition to the various national rivalries that dominate Earth orbit, this chapter describes the myriad installations that encircle the Earth: battle stations, orbital aerospace bases, black hole and solar power satellites, as well as others. In fact, the presence of so many installations forms the second major element of this chapter: the day-to-day operations that allow this region to function. Discussions of navigation control, orbital congestion, and the interface with the Earth and the Moon are all treated. Ancillary issues, such as space industries, salvage operations, eviction of orbital squatters, rescue missions, and the legal ramifications of travel (customs, jurisdiction, etc.) are covered, allowing the GM to simulate the hustle and bustle of orbital life -- and how to use it in a *Transhuman Space* campaign.

Additional Considerations

Earth orbit possesses numerous unusual conditions and hazards for the unwary. GMs running extended adventures or campaigns in the region should familiarize themselves with several rules found in *GURPS Space*, most importantly those concerning Low Gravity, Microgravity, and Zero Gravity (S99-100). In addition, the sections on Health Problems in Micro- or Zero

Gravity (S101), Space Sickness (S102), and Decompression (S104-105) will be of particular usefulness. While there's no requirement that any of these rules be used in a *Transhuman Space* campaign, they do add a great deal of flavor -- and danger -- which can be useful in certain styles of play.

General Observations

As noted above, Earth orbit is a veritable halo of satellites and stations, with over two million artificial objects surrounding the globe at any given time. Nevertheless, Earth orbit is a highly regulated and orderly place. The vast majority of objects in orbit belong to corporations and governments, although private individuals also own many as well. While inserting a satellite into low Earth orbit is theoretically inexpensive, a variety of international agreements set up bureaucratic roadblocks that even money can't always overcome. It's easy to understand why. Since the mid-twentieth century, humanity has been cluttering Earth orbit with all manner of satellites, junk, and debris. To ensure that that sort of haphazard treatment of the region does not occur again, the Orbital Advisory Agency (OAA) was created in Geneva. The OAA oversees the placement of new objects into orbit and advises nations, corporations, and individuals on the strictures of the Revised Outer Space Treaty. Although it has no formal enforcement arm, it cooperates with other non-governmental organizations like the Commission for Interplanetary Peace and Security. Consequently, few groups overtly act against the OAA's recommendations.

Despite these restrictions -- and the desire to keep orbit as tidy as possible -- many nations have launched military and intelligence satellites. Although allowed under the Revised Outer Space Treaty, there is growing concern that many of these objects have been disguised as civilian satellites in order to gain an advantage should another war break out in orbit. The Pacific War is still fresh in the minds of many nations, which continue to place their orbital installations on high alert. Most military and intelligence installations enforce a 10-mile approach limit around themselves. Commentators and analysts worry that it's only a matter of time before a navigational or pilot error results in the outbreak of another war. That's probably a pessimistic assumption, but it does accurately reflect the palpable tension that exists in Earth orbit.

In addition to the many unmanned satellites, there are approximately 400 permanently manned stations in Earth orbit. The largest is China's Taiko Station in High Earth Orbit. Taiko is not only huge, but it is an important stopover point on the route to Mars. Its closest rival in size is Columbia Station in geostationary orbit over Quito, Ecuador, which serves as the corporate headquarters of Columbia Aerospace. In addition, there are a large number of old-style orbital habitats constructed back in the 2020s and 2040s. Despite their failing power and unreliable life support, there's still a market for these cheap alternatives to places like

Taiko and Columbia. While the OAA recommends against the continued use of these ancient stations, there is very little the Agency can do to stop the practice.

For the purposes of regulation, the OAA divided Earth orbit into three distinct zones: Low Earth Orbit, High Earth Orbit, and Geostationary Earth Orbit.

Orbital Rivalries

Throughout the sections that follow there will frequent references to the various international rivalries that color the politics of Earth orbit. Because these rivalries are so vital to a proper understanding of the region, here's a brief primer on the rivalries in question.

European Union: The EU maintains good relations with most other nations in orbit, although its relations with the TSA have become strained since the Pacific War. The EU also demonstrates preservationist and pan-sapient tendencies, which tend to bring it into it into conflict with nations or groups that with different memes.

China: The dominant power of Earth and the solar system, China has good relations with Russia, Israel, Iran, Pakistan and Chile. It is also friendly toward the Islamic Caliphate. Its primary rivals are the Pacific Rim Alliance and the Transpacific Socialist Alliance. China does not consider the United States a serious rival, although the U.S does not return the favor.

India: Trying desperately to complete its growth into a Fourth Wave nation, India is a rival of both China and Pakistan. Its politics are growing increasingly nanosocialist, which means that it has become a concern for the United States as well.

Pacific Rim Alliance: The PRA is an avowed rival of China, at least in the sense of fearing the People's Republic's growing hegemony on Earth and the solar system. It has cordial relations with Europe and occasionally clashes with the United States because of its contacts on the Pacific coast of the former Canada.

Transpacific Socialist Alliance: Although composed of a wide variety of states across three continents, the TSA is beset by enemies on all sides. China is its primary combatant, but both the United States and the Islamic Caliphate have no love for nanosocialism. The PRA likewise engages in low-level

conflicts with the TSA. Since the conclusion of the Pacific War, the TSA has been on the defensive, which has led to increased activity in orbit -- some of it quite provocative. If another war does break out, there's a good chance the TSA will be behind it.

United States of America: No longer the world-girding superpower of the twentieth century, the U.S. remains an important player on the world stage. Its interests in Central and South America, as well as its opposition to nanosocialism, make an active participant in the system's low-level conflicts. In addition, it considers both the EU and China upstarts who've usurped its rightful place as the premier power of the current century. Such arrogance hasn't played well, giving the U.S. more enemies than friends.

Low Earth Orbit (LEO)

Low Earth Orbit is an extremely crowded region that encompasses everything from the top of the planet's atmosphere to the bottom of the Van Allen Belt. Objects in LEO are only between 200 and 500 miles above the Earth. Because they orbit so closely, they must travel very quickly to overcome the pull of the planet's gravity. Objects in LEO travel at 17,000 miles per hour and can encircle Earth in approximately 90 minutes. Unfortunately, their high speeds prevent them from viewing more than a small portion of the Earth at any given time. On the other hand, LEO remains useful because its nearness to the Earth gives it spectacular views. Satellites that observe the planet, like remote sensing and weather satellites, often travel in LEO because it allows them to capture extremely detailed pictures of the Earth.

Even more so than the rest of Earth orbit, LEO is absolutely cluttered with artificial objects. Organizations like the United States Space Command, the European Space Agency, the China National Space Agency, and the OAA all keep track of the hundreds of thousands of objects that circle the globe in LEO. The combination of their large numbers and high speeds creates a potential danger for spacecraft leaving the Earth for higher orbits, as well as for other objects placed in the same orbit. Most of these objects are quite small -- only a few feet in length -- but some contain forgotten lab experiments and deadly chemicals that are not easily removed. An entire industry of salvage experts has sprung up as a consequence, creating opportunities for those willing to risk their lives and their health for the high fees they can command.

Geostationary Earth Orbit (GEO)

Geostationary Earth Orbit (also called Geosynchronous Earth Orbit) is located at 23,000 miles above the equator. At that distance, it takes a satellite a full 24 hours to circle the

planet. Since it takes Earth 24 hours to spin on in its axis, the satellite and Earth move together. This means a satellite in GEO always stays directly over the same spot on Earth. Because they're so far away, GEO satellites have a very broad view of the Earth. For example, the footprint of one Marwari Digital broadcast satellite covers the entirety of North America! This makes GEO the preferred locale for communications and other unmanned satellites.

Geostationary orbit contains the largest number of facilities owned and administered by corporations. Some of these facilities are the thousands of orbital factories that supply human space with vacuum-engineered products like drugs, foamed alloys, and high-purity crystals. These products are then shipped to either Earth or to other orbital stations for additional manufacturing and processing. Other facilities include offices and headquarters, particularly of corporations whose primary business interests are off the Earth's surface. The massive Columbia Station is one of the most well known examples of this type of facility.

Columbia Deep Space Port

More commonly called Columbia Station, the Columbia Deep Space Port is one of the few orbital facilities to rival China's Taiko Station. With a transient population of thousands, the station was constructed during 2060's to support Columbia Aerospace's growing offworld concerns, including its exploration of Titan as a source of He3. However, the origins of the port go back to the early 21st century, when the corporation constructed its first launch facility at Quito, Ecuador. As Columbia Aerospace diversified its interests, the Quito space port became one of only two Class V facilities on Earth, as well as its busiest port. Multiple launches occurred each day, becoming dozens as the century wore on. Eventually, Columbia Aerospace saw too many benefits in adding an orbital component to their ground-based port to pass it up and began construction of the not-so-subtly named Columbia Deep Space Port.

As the 22nd century dawns, Columbia Station remains an important center of business. If anything, it's become even more significant. Columbia Aerospace opened the station to other corporations in 2091. This was done partly as a public relations move and partly to acquire capital to finance the expansion of the port. The first outside corporation to take up residence there was Solar Express, whose yellow-and-purple ships are now a common sight at Columbia. Other corporations soon followed, such as Takamatsu-Hegenauer and Mathanakaran. Now, the station positively bustles with corporate employees and businesspeople, which only adds to the contrast between Columbia and Taiko Stations -- the only other facility to rival it in size.

Equally significant for Columbia Station is the presence of a regional headquarters for the National Aeronautics and Space Administration (NASA). This headquarters predates the opening of the station to outsiders. In fact, NASA has had a small presence there since 2070,

when the United States announced the NAGHI project to explore and settle Titan. As this project got seriously underway, NASA has slowly expanded its presence, so that it now has several dozen personnel on Columbia Station. Most are administrators and liaison officers who coordinate with Columbia Aerospace and other members of the Titan Consortium. Nevertheless, there's no question that NASA is an important player on the station, one whose influence may increase even further as Titan becomes more important in the affairs of human space.

Columbia Station

Space Port Type: Class V

Transient Population: 7,000

Control Rating: 4

Columbia Aerospace

Columbia Aerospace was originally an American corporation, but its relentless drive for domination of the aerospace industry led it to seek markets -- and employees -- from across the globe. As early as 2020, the corporation had expanded its holdings into South America and the Pacific. By the time it collaborated with Nanodynamics in the construction of the SkyFac orbital factory in 2027, Columbia had begun its evolution into a true transnational. Its final evolution occurred when it transferred its headquarters from California to Columbia Deep Space Port in 2064.

Despite its current status, Columbia maintains close relations with the Pentagon and other elements of the American Department of Defense, such as the Aerospace Force. Its major products are spacecraft, fusion torch drives, and lasers. These product lines have aided it in becoming the largest defense contractor in the solar system. In addition to the United States, Columbia provides products for nations like Brazil and other South American states, among others. Rumors abound that Columbia also provides goods to any group who can pay its premium prices, whatever their politics. For its part, Columbia denies these allegations, claiming they're part of a smear campaign by its many competitors.

Ramon Mackenzie

Born in Dallas, Texas, Ramon Mackenzie had every advantage in his young life: a good home, loving parents, the best education money could buy. He also possessed a level of determination unseen in many young people, who saw

only opportunities for leisure in the new technologies of the 21st century. Instead, Mackenzie set his sights on finding ways to use these technologies to turn a profit -- both for himself and his employers.

He got his chance when Columbia Aerospace signed him to a contract in 2047 at the age of 24. Over the course of the next five decades, Mackenzie devoted himself fully to Columbia, providing his employers with innovative advice and business plans. He advocated the corporation's exploration of Titan in the 2050's and he advised the opening of Columbia Station to outside interests. By the time he rose to the rank of Chief Executive Officer in 2083, he had worked in nearly every branch of the corporation and handpicked the majority of its senior executives.

Ramon Mackenzie is an older man with a winning smile and a full head of thick, dark hair. Although in excellent health, his physique has adapted to life in the lower gravity of Columbia Station, where he spends most of his time. This weakens him on the rare occasions he visits Earth, which is why Mackenzie prefers to arrange all his meetings at the corporate headquarters or somewhere else in Earth orbit.

Solar Express (SOLEX)

Solar Express is yet another corporation to have moved its headquarters to Earth orbit. Unlike many, it remains associated with its originating nation, in this case the United States. Indeed, SOLEX seems positively reluctant to establish itself as a transnational, perhaps out of concern that the U.S. government or military might cancel the lucrative contracts they currently hold with the corporation. In any event, SOLEX is a permanent fixture of life in orbit. Its yellow-and-purple vessels are as common a sight in this region of space as in any -- perhaps more so.

Solar Express is also a major supporter of the Farhaulers' Guild, whose members it uses on all its vessels. It's said this move has helped maintain the dominance SOLEX has in its field, thanks to the Guild's willingness to "convince" competitors that they'd best consider looking elsewhere for a means to turn a profit. Little proof of these allegations exists, but enough isolated incidents have been recorded to worry even ardent supporters of the Guild. For its part, the Guild seems happy with its arrangement with SOLEX and, by all accounts, is partially responsible for the corporation's phenomenal ability to deliver to anywhere in the solar system at reasonable prices.

Amandado Spacecraft Factory

Located in a Geostationary orbit compatible with Columbia Station is the Amandado Spacecraft Factory. The Factory is immense, being over 800 feet long and comprising over 20 distinct decks. At any given time, close to a dozen space going vessels are being constructed by either Columbia Aerospace (which owns the factory) or one of its allied corporations, like Ellis Interface. Amandado is largely automated, but it has a small population of human overseers, who are swapped out on a regular basis. Because life on the factory is tedious in the extreme, it's not a popular assignment among Columbia Aerospace personnel (or anyone else for that matter). Most companies offer bonuses and other incentives to encourage workers to take a stint aboard Amandado. It's also said that workers sometimes make additional money by allowing access to the station to Chinese and Indian spies, who'd dearly like access to Columbia's vehicle blueprints and designs.

Auremond-Hilton Orbital Hotel

Located in GEO above Africa, the Auremond-Hilton is an extravagant example of folly in action. Its builders believed they were creating the groundwork for a series of orbit hotels throughout the solar system. When they obtained the Geostationary orbit in 2077, the Auremond-Hilton Corporation saw it as the jewel in the crown of their lucrative business. Transports to Mars and the Moon were becoming increasingly commonplace; surely it was only a matter of time before spending time vacationing in orbit would be the latest fashion. Thus, they constructed their hotel with every amenity possible, including lavish microgravity arenas and theaters (for ballet).

When the Auremond-Hilton proved to be both more expensive to maintain and less popular than its owners anticipated, it was a fiasco. By 2086, the Auremond-Hilton Corporation had gone bankrupt and its assets were sold off to pay its debts -- including the Hotel. Since then, the Orbital Hotel has changed hands over a dozen times, as each new owner attempts to find a way to make it profitable. Since 2097, it's been owned by Nikolai Nakaunicina, a mysterious figure who's rarely seen in public. His reticence to speak to the media, as well as his immense wealth, has led to lots of speculation about his true identity. The theory currently in vogue is that he is actually Dr. Tse Chang or Enrico Balthazar. Neither theory has been confirmed or denied.

High Earth Orbit (HEO)

High Earth Orbit is the final of the three orbital zones above the globe. It begins just above the inner Van Allen belt (approximately 3,000 miles up) and extends as far as 22,000 miles. It provides an excellent view of the entire planet and does not require that objects placed in this orbit reach exceedingly high speeds. Its primary drawback is expense. Placing a satellite or station in HEO costs much more than either LEO or GEO. This limits the governments,

groups, and individuals that have access to the orbit.

Consequently, the majority of the objects in HEO belong to one of the five great powers or large corporations. A greater percentage of these objects are permanently manned. These include laboratories, skyfacs, and military bases, as well as two space ports: Taiko and Espoir.

Taiko Station Space Port

Construction on Taiko Station was begun in 2059 as an adjunct to China's decision to colonize Mars. Although it would still be several years before the People's Republic would make its first tentative moves toward placing human beings on the Red Planet, its leadership showed great forethought. Once Taiko was completed, it made a perfect launching point for Terraforming and colonization missions. As the population of Mars increased, the station became a convenient -- and popular -- waystation along the journey. Indeed, many non-Chinese colonists, particularly Arabs and Europeans, begin their trip to Mars by passing through Taiko Station.

Supporting China's Mars Province forms the bulk of Taiko's day-to-day operations. The station houses an offworld branch of the Ministry of Extraterrestrial Territories, as well as related government agencies. Likewise, corporations, such as Mars Interplanetary, Xiao Chu, and Biotech Euphrates maintain offices here. In fact, Taiko is headquarters of Mars Interplanetary. The corporation's board of directors meet aboard the station and the majority of its administration can be found here as well.

Of course, Taiko supports a great more than the colonization of Mars and the deep beyond. The station is also home to several units of the People's Liberation Army Navy Space Force -- mostly PLAN Space Infantry Division troops and transatmospheric fighter squadrons. Taiko Station is the primary base for one of China's three SID brigades. Those aboard the station spend most of their time in training, learning the latest techniques for using battlesuits and attack drones in combat. Most of these SID soldiers are bioroids who consider service offworld to be a signal honor and one that may well result in greater advancement over time.

Unlike Columbia Station, Taiko also possesses a civilian population not associated with either governmental or corporate activities. Although only several hundred in number, they exist to provide maintenance to the station, as well as other services that the Chinese have not relegated to automation or robotics. This makes Taiko seem oddly crowded in comparison to more solidly Fourth Wave facilities. Humans sympathetic to preservationism find this mildly comforting -- until PLA SID bioroid soldiers make their appearance. In any event, Taiko's civilians live in a small habitat ring whose accommodations are small but inexpensive.

Taiko Station

Space Port Type: Class IV

Transient Population: 30,000

Control Rating: 5

Mars Interplanetary

Mars Interplanetary is probably the solar system's biggest interplanetary shipping carriers, although firms like Sratya Freight and Sejikam Carries dispute this. Whatever the truth, there's no denying the prominent place the corporation plays in the development of China's offworld colonies. It provides the Chinese government with huge transport vessels to move both colonists and equipment to the Red Planet. Ironically, Mars Interplanetary also runs several luxury space lines as well, such as Kanghua Lines and Jiawen Lines.

Mars Interplanetary's importance to colonial development has contributed greatly to the growth of Taiko Station. The corporation provided not only the initial impetus to the station's construction, as well as funds for its completion. More than half the transients on the station can also be traced to Mars Interplanetary or one of its subsidiary corporations. Not surprisingly, the Chinese government has established a close relationship with Mars Interplanetary, which has made its board of directors very rich indeed.

Even so, all is not rosy for the corporation. As a cost cutting measure -- or to ensure more profits, depending on your perspective -- Mars Interplanetary fired most of its human employees in 2086, replacing them with bioroids grown by Biotech Euphrates and Xiao Chu. This move didn't set well with some of the company's investors, who worried about the bad reaction from preservationists and other anti-bioroid groups. Thus far, there's been no significant backlash and Mars Interplanetary remains one of the most profitable and smoothly run corporations in the system.

Much more interesting is the relationship between the corporation and the Farhaulers' Guild. The Guild owes its very existence to the replacement of humans with bioroids. In its aftermath, the Guild gained instant recognition and influence. At present, over half of all freight carried in the system is done on Guild vessels. This has led some conspiracy theorists to argue that the Guild is actually just a front for Mars Interplanetary, allowing them to expand their tendrils into other areas beyond their already lucrative ventures.

Gao Dewai

Gao Dewai is the current Chief Operating Officer for Mars Interplanetary. Born in Shanghai on Earth, he now spends most of his time in orbit aboard Taiko Station or visiting China's Mars Province. Unlike his predecessors, Gao is extremely laid-back and willingly delegates authority to his underlings. Indeed, some members of the board worry that his seemingly lackadaisical attitude might one day threaten the corporation's profits. For example, the decision to replace human workers with bioroids was made not by Gao himself but by a subordinate within the Office of Management. Although Gao's methods are somewhat unorthodox, he has yet to make a major misstep -- which is what undoubtedly allows him to retain his position.

Xiao Chu

Sometimes derided as "Rust China Inc.," Xiao Chu is a huge corporation specializing in industrial nanotechnology, microtechnology, nano-biotechnology, and space systems. Along with Mars Interplanetary, it was an early proponent of the Chinese colonization of Mars. Consequently, it is also a major power on the Red Planet, where its headquarters is located (in the city of New Shanghai). It's also a significant rival of the Titan Consortium, due to its development of black holes in the asteroid belt.

On Taiko Station, Xiao Chu provides numerous services, most notably the bioroids used by both the Chinese military and Mars Interplanetary. Indeed, the purchase of an entire workforce of bioroids has brought the two corporations closer together than ever. This frightens their competitors, as well as elements of the Chinese government. These conservatives fear that the combination of two such powerful corporations with so many interests vital to China could result in the People's Republic's becoming too dependent upon them. As a safeguard against this, the Chinese government has become a major stockholder in Xiao Chu.

Weiguo Orbital Correctional Facility

The existence of this facility is known only to the highest levels of the Chinese government, as well as to their counterparts in certain rival nations (who obtained the information through espionage). The secrecy surrounding Weiguo is twofold. Firstly, the People's Republic does not wish to admit that it operates an orbital gulag in HEO. China already suffers from poor public relations in many nations since the end of the Pacific War. Its leadership does not wish to add to its troubles by acknowledging that Weiguo is anything other than a "traffic control station."

The second reason for secrecy is far more troubling. Weiguo doesn't hold ordinary criminals

or even dissidents. Rather, it holds a number of Chinese bioroids that have gone rogue over the past decade. The rogues, almost all of whom are part of Weimin clade of combat bioroids, seem to have organized themselves into a resistance movement against Chinese "exploitation." The language used by the rogues suggests contact with agents of Die Bioroiden Befreiungsfront. However, BBF usually loudly trumpets its involvement in bioroid liberation, which they have not done as yet. This suggests that *another* group may be behind these rogue actions. If so, it's understandable why China wishes to keep their existence -- and that of Weiguo -- a secret from the rest of the system.

Espoir Space Port

Although Columbia and Taiko Stations get the most attention due to their immense size and large transient populations, they aren't the only space ports in orbit around the Earth. The European Union's Espoir Station is the third major station in the region. Jointly administered by France and Germany (who call it Hoffnung Station), its primary purpose is interfacing with the EU space port in French Guiana, although it also serves as a European Space Control Agency facility. Unlike La Salle Station, for example, Espoir has only a minimal military contingent, mostly for security purposes.

The transient population of the station reflects a combination of civilian travelers from the Earth's surface and those coming from the deep beyond. Relatively few businesses and corporations have set up shop here, since most prefer the more spacious (and inexpensive) accommodations of Columbia Station. Consequently, Espoir attracts a greater number of non-governmental organizations and groups, like the Human Alliance and the Farhaulers' Guild. The Alliance is especially well represented here, possibly because of its popularity in Europe.

On a more prurient note, Espoir was the site of a series of murders of bioroids and other parahumans in late 2098. Radical members of the Human Alliance were suspected of the crimes, but the method -- genetically tailored nanoviruses -- pointed to other groups, such as Exiles from the TSA. An Indonesian woman named Ulfah Bintang was arrested for the murders, but never charged. She was released in 2099 and threatened to sue Espoir's security detachment for wrongful arrest. However, Bintang disappeared only days after being released from custody, making the matter even more mysterious. Thus far, no adequate explanation for either the murders or Bintang's disappearance has been offered, although rumors abound.

Espoir Station

Space Port Type: Class IV

Transient Population: 5,000

TEN Orbital Broadcast Center

Placed in HEO in late 2082, the broadcast center serves the Telepresence Experience Network and its affiliated entertainment stations. It's entirely owned by Marwari Digital and has no other purpose than round-the-clock broadcasting of news and entertainment programming for the teeming billions of Earth. The Center also functions as a huge "communications antenna" for other corporations. Its vast sensor arrays collect and transmit millions of personal communications per second. Most individuals on Earth and in orbit use the Broadcast Center whenever they use their micro-communicators, sensory uplinks, and other communications devices. Some analysts have argued that Marwari makes more money selling access to its communications array than it does as a broadcaster of original programming. No one's ever proven this assertion -- and Marwari's not talking -- but it's certainly a plausible line of argument.

Espirito Santo

Espirito Santo is a Brazilian biotechnology station. Its small population of scientists and researchers are primarily interested in ecological reclamation technologies. Although the Earth has made great strides toward recovering from the damage done in the nineteenth and twentieth centuries, there's still a long way to go in some areas, particularly Africa and Asia. A consortium of South American firms, most notably Pereira Laboratories and Machado-Matheson Limited, maintains the station.

Other Orbital Objects

The information listed here only covers the barest minimum of the over two million artificial objects that encircle the Earth. Nevertheless, one of the key characteristics of Earth orbit is its congestion. To use this element in his scenarios, the GM needs to know what other sorts of objects are present in the region. Here's a brief listing:

Battle Stations: This category includes both manned and unmanned orbital defense platforms. Some use active weaponry to seek out targets, while others use passive weapons to create a "shield" over the territory they protect. The Revised Outer Space Treaty allows the creation of battle stations, which is why almost every nation on Earth has at least a handful of them in orbit. Unless the characters intend to visit one, the most important characteristic of a battle station is its absolute inviolability. Almost every nation enforces the 10-mile limit around it with extreme prejudice.

Orbital Aerospace Bases: Related to battle stations are aerospace bases. They're always manned by at least squadrons of transatmospheric and interceptor fighter. They also frequently possess spaceborne contingents for use either as security or teletroopers. Aerospace bases enforce the 10-mile limit vigorously, but are more likely to aid civilians in distress than are battle stations.

Power Satellites: These are commonly solar in design and transmit their power both the Earth and other orbital installations. Corporations generally own them, although states like China and the TSA own them as well. There's been talk of transferring black hole power satellites into Earth orbit, but the mere mention of such a thing has caused an uproar. The Orbital Advisory Agency has recommended strongly *against* such a move by any corporation or nation. The concerns over one of the mini-black holes getting loose or otherwise going awry are too great. Consequently, there are no serious plans to follow through with this in the near future.

Research Satellites: Typically unmanned, these small objects collect data about a narrow range of phenomena to send back to their sponsors. They're often accused of being spy satellites -- which many are -- but the genuine scientific research continues everywhere. High powered telescopes and SETI devices are among the least esoteric of these satellites.

Communications Satellites: With the presence of the TEN Orbital Broadcast Center array, a lot of these have become obsolete. Nevertheless, many corporations and nations have no interest in their secure transmissions being routed through TEN.

Military Organizations

As noted throughout this chapter, Earth orbit is bristling with military installations of nearly every nation and alliance on Earth. While Taiko Station has already been described, it's not the only facility of its kind in orbit. For that matter, it's not the only *Chinese* facility of its sort in orbit. While many of these facilities are unmanned, others are not. The latter are home to one or more military units, each with a distinct role in the ongoing tensions that characterize this region of human space. This section briefly describes these facilities and the units associated with them, if any.

The Pacific War

If Earth orbit were a puzzle of tension and animosity, the Pacific War would be the missing piece. More than any other event, this conflict colors the current situation in orbit. The war confirmed China's dominance of both the Earth and space. It also saw the growth of the Pacific Rim Alliance and the comeuppance

of the Transpacific Socialist Alliance. Each of these factors has contributed greatly to the current situation in this region of human space.

China remains the big boy on the virtual block. Its space defense platforms and stations are difficult to forget. They're found in every orbit and number in the hundreds. Because they were used to such good effect in the War, that makes a lot of people nervous. China has always been a model world citizen, but it's never been afraid to throw its considerable weight around when its interests were threatened -- which is quite often. Thus, there's a natural concern that China's victory in the War may result in its becoming a bully in orbit. That hasn't happened yet, but doesn't mean that it couldn't. GMs should keep this in mind, in order to effectively use the War as the basis for adventures in orbit.

The defeat of the TSA is another important element to Earth orbit. Not only did it reduce the Alliance's presence in orbit to almost nothing, but it created numerous terrorist and activist groups loyal to nanosocialism. Exiled members of the TSA Weapons Directorate also fled into orbit, although none have been seen there in several years. That doesn't change the fact that the *implied threat* of their presence adds yet another element to orbital tension. In addition, many groups with very different agendas use nanosocialist rhetoric as a cover for their own activities, making it difficult to get to the truth of the matter.

Peoples Liberation Army Navy Space Force

In addition to Taiko Station, the PLAN-SF maintains hundreds of defense platforms and other facilities in Earth orbit. Consequently, it's impossible to do more than scratch the surface in describing China's military presence in the region. However, two manned facilities deserve special mention: Wuxing and Zhengyang Stations.

Wuxing Station

Located in HEO, Wuxing Station is a training and launching base for the PLA Space Infantry Division. Although nominally part of the brigade attached to Taiko Station, the 12th Transatmospheric Rapid Deployment Company is an elite unit used by the Chinese military for commando actions against terrorists and other criminal groups. The company is charged with protecting the myriad Chinese space stations and other orbital facilities. Composed of battlesuited bioroids, the 12th Company has begun to experiment with sapient cybershells as well, which is why it's given some autonomy from the rest of the Taiko-based brigade. To date, the company has seen action only against snakeheads and TSA exiles seeking revenge for the Pacific War.

Zhengyang Station

Located in GEO above the eastern Pacific Ocean, Zhengyang Station is officially the headquarters of the Anhua Development Group, a corporation of the People's Armed Police devoted to importing vacuum-produced items to China and its allies on Earth. However, most analysts believe Zhengyang is actually a major base for the Tenth Bureau of the Ministry of State Security. This assertions makes a great deal of sense given the station's relative proximity to Columbia Station, as well as Bureau 10's focus on *industrial* rather than political espionage. Consequently, Zhengyang has been the focus of terrorism by anti-Chinese groups. As recently as 2098, unknown assailants released a nanovirus into the station. Fortunately for Zhengyang's inhabitants, the plot was foiled, although the culprits remain at large.

European Space Control Agency (ESCA)

Unlike China, the European Union prefers unmanned installations and defense platforms to manned ones. ESCA has deployed over one hundred robotic space defense systems, as well as AKV interceptors to guarantee the protection of its members. In addition, ESCA coordinates the forces of its member states, some of whom do maintain manned installations. Though small by comparison to those of China or even the United States, they nevertheless are a significant presence in Earth orbit.

La Salle Station

La Salle Station is the largest orbital facility under the jurisdiction of ESCA. Funded and staffed by France, it's also home to the 41st Marine Battalion as well as several squadrons of the AKVs that distinguish the *Force Aérospatiale* from other European armed services. La Salle station is a purely military base, with a minimal civilian population, most of them being defense contractors and intelligence personnel. There are also liaison officers from both the British Royal Navy Space Service and the German Federal Space Force.

Accordo Station

This small station is in HEO and is maintained by the Italian Space Navy. Its crew is composed of a rapid deployment force used primarily for small police actions and humanitarian missions. In 2097, for example, Italian teletroopers entered the L-5 region to flush out mobsters associated with the Martian Triads. Although these raids didn't put an end to the Triads' influence, it was a public relations coup for the Italians and their fellow Europeans. Since then, they've been more cautious, but are still more likely to pursue peacekeeping and policing missions than the Chinese or even the Americans.

United States Aerospace Force

The U.S. Aerospace Force controls multiple installations throughout Earth orbit. In part due to its struggle to prove itself in the face of the other services -- particularly the Navy -- the Aerospace Force has a reputation for being somewhat more gung-ho than is prudent. Although unwilling to risk lives or property without proper authorization, Aerospace commanders frequently pursue their orders with gusto.

Fort Yeager

Located in HEO, Fort Yeager is home to one of Deep Space Command's two Space Wings. This wing consists of a half-dozen SDVs, as well as transport and support vessels. The Fort houses the personnel needed to man and maintain these vehicles. It's also the primary base for 101st Spaceborne Assault Division, teletroopers who have a fierce rivalry with the better-known 82nd Spaceborne Division. The commander of the 101st, Colonel Geraldo Pevere, is an uncharacteristically jocular man with a disdain for the "old ways" revered by many military commanders. Pevere is an unflinching technophile, who believes that any technological innovation that keeps his men from getting killed is well worth using -- tradition be damned. While this has endeared him to his troops, it's brought him into conflict with his superiors, some of whom would dearly love an excuse to remove him from his command.

DeSoto Base

Named for a hero of the Andes War, DeSoto Base is a military listening post in GEO above the western Pacific Ocean. The Base provides important intelligence to the U.S. military about its rivals in China and the Transpacific Socialist Alliance. During the Pacific War, some of the latter information was shared with the Chinese in exchange for information the Chinese possessed about TSA insurgencies in South America. This rare instance of Sino-American cooperation was just that -- rare. Now, China considers DeSoto Base "an affront" to its sovereignty and a blatant attempt by the United States to spy on the People's Republic. For its part, the U.S. has never denied the Base's role in gathering intelligence, but it has regularly stated that its presence is "not intended as a provocation." Nevertheless, it's a constant source of tension between the two great powers and may yet cause an international incident.

Samuel DeSoto (2011--2094)

Major Samuel DeSoto was a U.S. Army Ranger sent to Peru as an advisor to the Peruvian government. DeSoto made several recommendations for defeating the "Red Sword" insurgency that plagued the South American nation.

Unfortunately, the Peruvians didn't heed DeSoto's recommendation, resulting in the spread of the insurgency and the capture of key governmental personnel. After reading DeSoto's reports, the United States, Brazil, and Chile committed forces to fighting the insurgency. Even after the U.S. began using teletroopers, DeSoto remained on the ground, providing human intelligence that proved vital to his country's war effort. He didn't leave Peru until the fall of Lima in 2055. Upon his return, he was highly decorated and eventually rose to become Secretary of Defense in the O'Neill administration.

Indian Aerospace Force

India maintains one of the solar system's largest military forces. In fact, it possesses almost as many units as China. However, India's forces are largely antiquated Third Wave units, with a small -- but growing -- core of Fourth Wave units. A significant portion of these Fourth Wave units reside in Earth orbit, protecting India's possessions there from Chinese mischief.

Peshawar Base

Located in GEO above the region of the same name, Peshawar Base is home to the Indian Aerospace Force's 4th Transatmospheric Squadron (the "Oorials"), as well as the 10th Bioroid Division. These units are among the most advanced in the Indian military, making them a source of pride for the base's commander, General Narinder Nayak. Nayak is a veteran of border clashes with China and places great importance in the modernization of India's armed forces. He considers Peshawar Base to be the first step toward making India a major player in Earth orbit. General Nayak is opposed to nanosocialism, which contributes to his popularity with India's current government, the Indian National Alliance, and may well explain his appointment to such a high profile assignment. Should the next election turn against the party, Nayak may find himself replaced with someone more in line with nanosocialist principles.

Pacific Rim Alliance

The Pacific Rim Alliance exists primarily as a military counterweight to the immense power and influence of China. Its primary members -- Japan, Korea, and Australia -- are all advanced nations, whose militaries are Fourth and Fifth Wave on Earth. The same holds true in orbit, where the PRA has sizable aerospace and Special Forces, in addition to an effective defense shield. Their networks of orbital facilities are part of a growing effort to produce an active nano-defense shield. Since the Pacific War, the PRA has become almost paranoid in its desire to prevent rivals like the TSA and China from launching deadly weapons into their territory. Their many orbital bases are thus a lynchpin in securing their safety.

Woomera Base

This small facility is maintained by the Royal Australian Aerospace Force and possesses only a very small crew. Located in HEO, it's theoretically the orbital component of the Class III space port on the Earth's surface. Its primary function is communications and traffic control, coordinating flights from Australia into orbit and on to the Moon. However, that role has expanded in the last five years. Consequently, Woomera Base has expanded with it. Since 2096, the Pacific Rim Alliance has made a sizable investment in the Base. Although unconfirmed, it's believed the PRA military command intends to make Woomera the nucleus of their active nano-defense shield. China has expressed concerns over this possibility, as has the United States and India. Nevertheless, the expansion continues and it's likely the PRA will complete their endeavors by early 2102.

Hong Station

Unlike Woomera Base, Hong Station is a strictly military installation, housing elements of the 16th Combined Transatmospheric Assault Division. The Division consists largely of Korean units, although there are Japanese and Australian elements as well. Both transatmospheric fighters and AKVs make up the Division, supplemented by a small force of bioroids for use in actions against criminals and other low-level threats. Hong Station is found in HEO and is more a symbol of the PRA's unwillingness to concede orbital supremacy to its rivals than a genuine threat to China, the U.S., or India. Nevertheless, it's yet another example of the tension situation that exists high above the Earth's atmosphere.

Transpacific Socialist Alliance

The Transpacific Socialist Alliance possesses the weakest military of the great powers of the solar system. Most of its components are solidly Third Wave, with a smattering of Fourth Wave special units. However, the TSA was formed specifically to bootstrap its members into the realm of the Fourth Wave and beyond. Consequently, its military shows a willingness to experiment with new technologies and to use those technologies against its rivals. This sort of behavior led to the TSA's defeat during the Pacific War. While the new leadership of the TSA has officially disavowed its predecessor's tactics, there's every reason to suspect that the new regime holds similar -- but more subtle -- views.

Soedjatmoko Base

Located in HEO, Soedjatmoko Base is the crowning achievement of the TSA's military modernization efforts. Almost entirely unmanned, the Base is a combination of communications relay point and deployment platform. It coordinates the defenses of the

TSA's many orbital facilities, as well as providing intelligence on China and India. Though unorthodox, this multi-purpose approach has served the TSA well. It's enabled the Alliance to economize without having to sacrifice effectiveness. That was an important consideration in the wake of the Pacific War. Soedjatmoko Base is very new, having been completed only in 2098. China has threatened the TSA about the existence of the base, claiming it's being used a haven for TSA Exiles from the previous regime. Few analysts believe this charges are any more than saber-rattling, but that doesn't change the fact that China is growing concerned about Soedjatmoko Base -- much to the pleasure of the TSA.

Minor Military Organizations

While the five major power dominate Earth orbit much as they dominate the Earth's surface, there are nevertheless other military installations in the region as well. Though less significant than those described above, their presence adds yet another facet to the proper understanding of the tension that permeates the region above Earth's surface.

Islamic Caliphate

Entering its second half-century of existence, the Islamic Caliphate is an increasingly fractious alliance of Arab nations, united in their common heritage and suspicion of the European Union and Iran. Because the Europeans maintain a sizable presence in orbit, the Caliphate's leadership established a token presence as well. Its Hisein Station is a small military outpost that houses a contingent of Third Wave aerospace fighters and personnel. Hisen Station is more an internal public relations ploy for the Caliphate's leadership than a serious military threat.

Israel

An ally of China, Israel relies heavily on the People's Republic for their orbital defenses. Nevertetheless, Israeli pride -- and a long tradition of military independence -- led to the creation of several orbital installations. Chief among these is Har-Zahav Base in HEO. Har-Zahav serves as the home base for two wings of Fourth Wave aerospace fighters, as well as a coordination point for Israeli ground forces. China provides some of the Israeli installations' operating budget, but with funds come with strings attached. Chinese vessels regularly use Har-Zahav as an orbital port and Chinese military personnel are a frequent site aboard others. This has led to several incidents, where overzealous Israelis have insulted or assaulted their Chinese guests. Both the Israeli and Chinese government play down these incidents, but they point to a growing disillusionment in the alliance among certain segments of the Israeli population.

Pakistan

Another ally of China, Pakistan maintains a handful of Third Wave bases, primarily as a counterweight to India's presence in orbit. Despite the desires of the Pakistani government, few of these bases are manned. Instead, Pakistan relies heavily on China for its orbital defenses. The primary exception to this is Nasim-ul-Ghani Base, which is home to a contingent of Pakistani aerospace fighters purchased from China. These fighters regularly patrol the 10-mile limit around their base, a move India considers provocative. Since 2090, there have been over a dozen incidents where the Pakistanis and Indians nearly came to blows. Thanks to Chinese diplomacy, these incidents haven't yet boiled over into a shooting war, but it's unclear how even glib-tongued ambassadors can carry the day.

Non-Governmental Organizations

Governments aren't the only large organizations with a presence in Earth orbit. Although the expense of placing facilities into HEO is considerable (as well as the near-impossibility of placing them in GEO), this has encouraged serious efforts by NGOs. In addition, several of these groups exist for reasons directly related to the unique nature of Earth orbit. Their presence here is significant and the source of conflicts with governments and corporations who resent their attempts to involve themselves in "internal matters."

Orbital Advisory Agency (OAA)

The Orbital Advisory Agency is a non-profit organization based in Geneva, Switzerland. Its expressed purpose is the "acquisition and distribution of data pertaining to Earth orbit and the objects therein for the purpose of preventing disasters and encouraging the proper treatment of the region." Put more simply, the OAA exists to collect and distribute artificial intelligence about Earth orbit to any government, group, or individual that intends to maintain or intends to maintain an orbital facility. The OAA does this with the purpose of preventing both conflicts and, more importantly, disasters.

The OAA came into being in the late 2040's as more and more space vessels traveled between the Earth and the Moon. The growing importance of He3 mining on the Moon led to several well-publicized disasters, most importantly the *Persephone* crash in 2049, which destroyed both a British vessel and a South African defense platform. The OAA was born from the sharing of orbital flight data from the EU, Australia, and South Africa, among others. Both China and the United States were initially reluctant to share their data, for fear it pose a threat to their national security. However, the wisdom of doing so became more apparent as the 2050's saw several more high profile disasters and near-disasters involving American and Chinese vessels and facilities.

Since then, the OAA has used a combination of free access to its extensive databases and good public relations to win over supporters. The Agency maintains a series of communications and traffic control satellites in HEO, as well as a small base in GEO (Harmony Station). Its operatives work closely with governments and corporations in the placement of new satellites and facilities. As a purely non-governmental organization, the OAA has no authority to enforce its recommendations, but that doesn't mean it's without influence. It has many outspoken advocates in the EU and the PRA, who use their positions to push the OAA's agenda of less cluttered and safer Earth orbital zones.

Commission for Interplanetary Peace and Security (CIPS)

Like its counterpart, the OAA, CIPS is a non-profit international organization without any enforcement authority. Founded in the wake of the Pacific War, its goal is more limited, but equally important: seeking diplomatic resolutions to problems before they can boil over into full-scale warfare. This means their commissioners work on places as diverse as Mars, the asteroid belt, and on the Earth to look for alternate means of resolving disputes, often with less success than they'd like.

In Earth orbit, CIPS frequently cooperates with the OAA when issues such as claims to geostationary orbits are heard. CIPS was instrumental, for example, in the decision to grant a GEO over the Atlantic Ocean to a European corporation that had purchased an American company that had previously held claim to the orbit. It was a small victory, to be sure, but CIPS' commissioners take great pride in preventing warfare from breaking out, especially in Earth orbit, where the consequences would be great indeed.

Orbital Protection Agency (OPA)

Another important NGO is the Orbital Protection Agency, jointly funded by China, the European Union, the Pacific Rim Alliance, and the United States. The OPA exists to coordinate salvage operations and clear orbital zones for the construction of new satellites and facilities. After a century and half of placing objects into orbit, Earth is surrounded by more junk and debris than many people could possibly imagine. That debris poses a risk to vessels, satellites, and facilities. The OPA exists to catalog it, issue warnings, and find someone capable of removing it.

The OPA would dearly love to become directly involved in the cleaning of Earth orbit. However, its limited budget (a compromise among the funding nations and alliances) does not allow such an extravagance. Instead, the OPA concentrates on locating the debris and providing its information to those interested in removing it in exchange for salvage rights. Unfortunately, this isn't always lucrative, which means the OPA can't always convince

someone to clean up the orbit as they'd wished. In such cases, their tracking data is passed on to the OAA, corporations, governments, and anyone else who'd be interested.

Genetic Regulatory Agency (GRA)

Technically not a NGO, the GRA is an intelligence and security agency founded by the European Union, Russia, and Ukraine to monitor and prevent the abuse of human genetic engineering. Most of its work is confined to pure intelligence gathering, relying largely on human intelligence, but augmented with information obtained from spysats and other sources. Until the last decade, the GRA confined its operations to the planet's surface. However, the Pacific War changed the situation considerably, as a combination of TSA exiles and criminal groups became more deeply involved in bioroid trafficking and genetic terrorism.

Consequently, the GRA finds itself stretched to the limits of its resources. It has only a small number of full-time operatives whose duty is to investigate and enforce genetic engineering protocols. Therefore, it frequently relies upon a combination of local police forces and freelancers to achieve its goals. The latter are certainly not favored by any of the GRA's sponsoring governments, but sometimes there's no other option available. Moreover, freelance agents were instrumental in uncovering an illegal bioroid growth facility aboard an Indonesian orbital facility in 2096.

That affair had a very high profile and has secured the image of "genetic bounty hunters" in the popular imagination. In 2099, a vid based on the incident was released, starring Shammi Nagrajhan in the role of Cami Ocalan, the leader of the freelance band that uncovered the facility. The popularity of the vid has put some pressure on the GRA either to train more personnel or expand its freelance program. However, neither option has been approved, as the sponsoring governments wrangle over their preferred course of action.

Corporations

Corporations have been involved in Earth orbit for almost as long as the technology to reach the region has existed. Many of the early satellites placed into orbit were done at the behest of corporations, looking to make a profit. As technology advanced and newer and better possibilities opened themselves up, it was the corporations who led the way in utilizing them. Orbital factories and manufacturing facilities are now an accepted part of life. As early as 2027, companies like Columbia Aerospace and Nanodynamics were placing industrial parks into orbit. These facilities have created many of the remarkable materials and devices of the transhuman era. Neither they nor the corporations that created them are going away anytime soon.

Ellison Interface

Ellison is an American corporation whose entire operation is located aboard Columbia Station. While they would at first glance appear to be competitors with Columbia Aerospace, they are in fact a complementary business that has achieved a strategic alliance with the owners of the station. Ellison produces "interface" craft, such as space planes, shuttles, and personal transports. These small vehicles are designed primarily to allow passage from Earth to orbit and vice versa. Ellison produces no craft capable of a voyage beyond the Earth-Moon system and thus doesn't impinge seriously upon Columbia's sphere of influence. In turn, Columbia recently transferred control of its small interface division in return for an unspecified amount of money, believed to be immense.

Nano-Solutions

Another American-based corporation, Nano-Solutions is a specialized manufacturer of nanomachines, particularly smart materials for use in a wide variety of applications. Nano-Solutions possesses several dozen subsidiaries, all of which specialize in a particular area: clothing, weapons, aerodynamics, building materials, etc. If there's an application for nanotechnology -- and there usually is -- Nano-Solutions has a subsidiary for it. It's also likely they've got an orbital factory as well. The company has a policy of using only orbital facilities for the production of its smart materials. Their reasons for doing so are a combination of concern over industrial espionage from China and India, as well as safety.

Swindoll-Hollings

Swindoll-Hollings is a European corporation devoted to medical research. Its scientists have accumulated more information about the effects of low, micro, and zero gravity than almost any other organization. They have used this information to produce a number of groundbreaking medicines and techniques to deal with conditions that occur only in orbit. Swindoll-Hollings has several facilities on the surface of the Earth, most in Great Britain and Scandinavia, but its orbital labs are where the latest cutting edge research is being done.

Takamatsu-Hegenauer

Based in the Pacific Rim Alliance, this corporation has an extensive network of manufacturing facilities in HEO. Most of these facilities produce industrial microbots for use in low or zero gravity environments. In this respect, T-H is a competitor with Nippon Uchuukaihatsu Kaisha, although T-H produces less expensive versions of the microbots than NUK. That has led to perception that T-H is a "cut rate" manufacturer, making it less popular among PRA consumers than NUK. Takamatsu-Hegenauer also produces several varieties of

microbot hunters as well, specifically designed to aid police and security agencies in discovering cargoes carrying their products. T-H considers this a "public service," but it has the additional effect of making their products very popular among criminal organizations that like to be able to track their wares.

Orbital Concerns

The congested nature of Earth orbit has created the need for a number of standard operating procedures in several areas. Although these procedures can and often do slow down passage from place to place, they're absolutely essential. Without them, the possibility for a serious mishap increases greatly. More importantly, their existence has proven an impediment to criminals, terrorists, and other unsavory characters, thereby ensuring that Earth orbit is safer than it might be without them.

Customs

Most nations possess a customs service of some sort. The purpose of these services varies from nation to nation, but they include several different roles. The most common is the collecting of duties on luxury items that pass from one jurisdiction to the next. Most orbital facilities are surrounded by a 10-mile limit in which their owning nation is assumed to have sovereignty. Thus, passing through it for the purpose of travel makes one subject to whatever duties the owning nation may choose to impose. Fortunately, the current era is one of largely free trade; most items are, in fact, immune from duties and other taxes.

Beyond the collecting of duties, customs services look for contraband and prevent the entry of illegal goods into their territory. This is by far one of the more elaborate and time-consuming elements of these services' responsibilities. Because illegal goods may be more easily hidden or otherwise disguised, and because a mistake could allow more than narcotics or firearms to enter, customs services typically employ several different technological devices to aid them in their work. Smugglers are thus the primary foes of the customs service. Chemsniffers, bio-enhanced sapient dogs, and microbot hunters all serve the cause of protecting a particular nation from contraband and controlled goods.

Weapons Laws

Most of the inhabited orbital stations possess a Control Rating of 4 or 5 and with good reason. Unrestricted access to weapons on a pressurized space station is asking for trouble, especially when you consider some of the high-powered weaponry available in 2100. That's why most stations coordinate with customs official to locate, categorize, and confiscate any unauthorized weapons

brought aboard them. Authorized possessors of weapons must present their credentials upon entering an orbital installation. In any event, it's advisable for the GM to keep in mind the potentially disastrous effects of the flagrant use of weapons in orbit.

Immigration

While most goods can travel freely across borders, the same cannot always be said for persons. Many nations and alliances have numerous restrictions to prevent entrance -- or, in some cases, exit -- across their borders, except by authorized individuals. Authorization in most cases takes the form of a passport. Provided the nations in question maintain diplomatic relations with one another, a passport allows movement with only a minimum of restrictions. This is the norm. In cases like the European Union or the Pacific Rim Alliance, citizens of one member state do not require a passport to travel to another member state. For example, a Korean can freely travel to Japan or Australia, as if she were a citizen of either of those countries.

Of course, freedom of movement is not the same as the right to do business or settle in a given area. Without special permissions, called visas, citizens of one country may not live permanently or work within the borders of another country. In the case of allies, such as the United States and Brazil, for example, whose citizens can easily obtain the visas necessary to live and work in one another's countries. If two nations are not allied or otherwise enjoy close relations, there may be a number of bureaucratic obstacles, ranging from fees to examinations, to obtain the desired visas.

Finally, there are closed nations like China that restrict access into and out of their borders. In cases like these, immigration regulations are quite tough and are designed to restrict the flow of information and goods. China's travel restrictions were once more difficult than they are at present, but they still remain one of the toughest in the transhuman age.

A Note about Borders

Throughout this chapter, there have been references to a nation's "borders," a concept that probably seemed nebulous at times. That's understandable, since the typical understanding of a nation's borders recalls two-dimensional lines on a map. For the purposes of international law, though, borders are very clearly defined and have been for decades. A nation's physical borders are those recognized by the nations that surround it through treaties and other mutual accepted documents. In some cases, this doesn't completely resolve the issue, but it does so to the satisfaction of most nations.

Unfortunately, the world is not two-dimensional. With the advent of space travel, the concept of a national border has become more complicated. In addition to the universally accepted notions of national airspace (up to 200 miles up) and national waters (up to three miles out), there is now an understanding of "national space." This encompasses a 10-mile limit around any orbital installation or satellite. Within that radius, the nation that owns the orbital object retains sovereignty and may exercise its jurisdiction.

For the most part, offworld colonies and installations are treated much as were embassies and consulates in past centuries. Though not contiguous with the land that makes up the state that possesses them, they are nevertheless within their jurisdiction. That means that any groups, from law enforcement agencies to corporations to militaries, that do not have expressed permission to do so cannot cross borders without violating another nation's sovereignty. This is an important consideration when running adventures in Earth orbit, where jurisdictions regularly change and create an unstable situation.

Traffic Control

With so many objects in Earth orbit, as well as the numerous space vessels that make their way through the region, traffic control is a high priority. Fortunately, humanity's experience with air traffic control in the last century provided a good model from which to build a more elaborate system for orbital use. Beginning in the 2030's, a number of standard procedures developed to handle orbital traffic. All space-going nations, alliances, and corporations, ensuring that there are no misunderstandings or mishaps, accept these.

Firstly, traffic control communications are handled by a dedicated system at every orbital port and station. This is done both for reasons of security and to guarantee that there are no interruptions in service. Public access to traffic control channels is severely restricted -- again as a security precaution. Likewise, traffic control equipment includes multiple failsafes and redundancies. Given the large number of possible errors that could occur, this is a reasonable course of action.

All navigational communications are conducted in either English, French, or Chinese. No other languages are recognized, even by control towers whose native tongue is not one of these three languages. Any vessel that arrives within a region administered by a particular traffic control authority is expected to notify that authority as soon as possible. The authority then instructs the vessel on local variances from the standard procedures. Pilots can obtain this information in advance if they wish it, but many variances occur so regularly that it's hardly worth the effort. At the GM's discretion, characters with the appropriate specialization in Area Knowledge may use that skill to simulate their knowledge of a particular nation's

local variances.

Navigational Aids

Besides the obvious communications satellites, most jurisdictions maintain navigational satellites to aid vessels when entering a region of Earth orbit. There are multiple varieties of these satellites, some of which have unique characteristics. They are:

Terminal Beacons: These simple beacons send out a constant signal so as to aid a vessel in orienting itself toward the landing or docking platform of a station or port. They're standard aids at almost every manned station in orbit, and even some automated ones possess them as well.

Global Positioning System (GPS): These satellites exist in networks scattered across the globe. Their purpose is to provide accurate and up to date information on objects on Earth's surface, as well as above it. Their primary usefulness is for vessels landing on Earth *from* orbit, as opposed to the other way around.

Marker Beacons: These special use beacons exist only when there is some unusual navigational hazard, such as a damaged space vessel or exceptional debris. The markers send are easily placed and send out a recognizable signal, instructing vessels to avoid the area in question until a salvage or clean-up crew can deal with the situation.

Search and Rescue

Most orbital facilities of any size have an emergency services division to deal with disasters of every sort. Their quality and level of service varies from facility to facility, with places like Columbia or Taiko Station having the highest level. Emergency procedures can serve as the basis for some interesting orbital adventures. Consequently, here's some basic information on the types of emergencies that are likely to occur:

Crashes: Collisions between orbital objects or crashes of any sort are thankfully rare, because they have the potential to destroy both lives and property. Traffic control procedures are usually tight enough to prevent them. However, when they do occur, they can destroy not only the objects or vessels directly involved, but those in the immediate vicinity.

Fire: Fire isn't a huge hazard in space. The lack of oxygen usually extinguishes most fires once exposed to vacuum. However, fire can pose a significant hazard on enclosed stations with recirculated air. In addition, explosions that have a constant supply of fuel, such as nuclear power plants, can continue to burn even once exposed to vacuum and thus present a

genuine hazard.

HAZMAT Incidents: There are too many different sorts of hazardous materials in orbit to list them all. That's why customs procedures are so strenuous: to prevent these materials from damaging an orbital facility or its inhabitants. They can spread through recirculated air, as well as on individuals and objects. That makes HAZMATs even more deadly. Many stations use microbots or chemsniffing devices to prevent such accidents, but they occasionally occur despite these efforts.

Orbital Adventuring

Earth orbit present many possibilities for adventures, providing situations that don't occur elsewhere in human space. In addition, the dangerous nature of the environment offers additional elements that can add greatly to the roleplaying experience of *Transhuman Space*. This section highlights a few of the character types and adventure possibilities that can occur in Earth orbit.

Character Types

Chapter 4 of *Transhuman Space* describes a wide variety of character types for use in this campaign setting. Many of them are unsuitable for use in Earth orbit (or are at least uncommon). Many of the others require small changes to reflect the specific realities of Earth orbit.

Advocate

Diplomats are very common in Earth orbit. Many work for either the OAA or CIPS, among other organizations. Their primary role is smoothing over differences between nations and groups whose orbital jurisdictions may have been violated in some fashion. They also negotiate the extradition of criminals and oversee joint operations between multiple groups.

Activist

Memetic activists are rarer in Earth orbit than they are in the L4 and L5 colonies or the deep beyond. This is because most orbital group see them as destabilizing elements that could upset the delicate balance of the region. Consequently, many activists operate as terrorists or fifth columnists. Nanosocialism advocates are the commonest in Earth orbit, but they're generally unwelcome, especially in areas controlled by either the United States or China.

Aerospace Pilot

Transatmospheric pilots are commonplace in every region of Earth orbit. They work for corporations, national militaries, and independent agencies. Military aerospace pilots are typically bound to their base of operations, which makes them unsuitable for non-military adventures or campaigns. On the other hand, their skills and access to vehicles make them attractive characters for games that move from region to region with Earth orbit.

Bounty Hunter

Like advocates, bounty hunters are an inevitable consequence of the multiple jurisdictions that color Earth orbit. Although it's not as easy to avoid extradition in this region as in, say, the deep beyond, it's still a tactic used by terrorists and criminals of all stripes. Bounty hunters help national governments and corporations overcome this tactic and are often quite effective. Because terrorist acts could prove very virulent in this tension region of space, the bounties offered for the capture of known or suspected terrorists are quite high. It's thus the perfect job for someone with the necessary skills looking to make a quick profit.

Criminal

All the money to be made in Earth orbit isn't legal. In fact, there's a lot of dubious activity in the region -- smuggling, immigration evasion, satellite theft, bioroid trafficking, and many more. The tense nature of life in orbit has worked against the creation of large criminal syndicates. Instead, small cells are the norm. Most cells tend to specialize in a particular type of crime and rely on other cells for backup and support when needed. It's created an anarchic situation that bedevils attempts to crush it -- probably because there's no central organization to destroy.

Dilettante

The idle rich are as common in Earth orbit as anywhere else in human space. Many of the older members of this clique -- centenarians mostly -- have taken to living in orbit out of the belief that it "slows the aging process." There's no proof of this belief, but it hasn't stopped these people with too much money and time on their hands from traveling from one habitat to another. A few of them have taken up semi-permanent residence on the Auremonde-Hilton Orbital Hotel, which only contributes to the eerie reputation that facility already has among travelers.

Farhauler

These "space truckers" can be found on Columbia Station, working for most of the

corporations that have set themselves up on that facility. They have a bad relationship with Mars Interplanetary and other associated Chinese corporations. That's led to a number of incidents on Taiko Station and elsewhere. Consequently, farhaulers have varying reputations depending on where one encounters them. Many also have connections to criminal cells, with whom they do speculative business of various sorts.

Genehacker

The advantages of there being so many objects in orbit is that it offers a lot of places to hide. Genehackers take full advantage of these opportunities, setting up shop on any station or facility that will have them. Although pursued by national law enforcement and the Genetic Regulatory Agency, genehackers are definitely in demand. Criminal bioroid traffickers depend on their expertise, as do other groups interested in illegal genetic modifications.

Gunjin

Gunjin is the Chinese term for a law enforcer and covers a wide variety of different professions. In Earth orbit, gunjin suffer from the wide number of jurisdictions. Unless states have open-ended extradition treaties with one another, it's often difficult to pursue perpetrators with any degree of success. The primary exceptions are law enforcers from member states of an alliance (like the PRA, for example), as well as groups like the GRA that have broad support from a number of states.

Hazmat Specialist

While most orbital groups try very hard to avoid letting dangerous materials get out of hand, it's not always possible. That's when the Hazmat Specialists come into play. In addition, there's plenty of dangerous material left over from the early part of the century -- and from twen-cen -- to keep them busy for a long time. Hazmat Specialists frequently cooperate with salvage teams in sterilizing dangerous objects and stations as well.

Intelligence Agent

Intelligence agents are almost as common as aerospace pilots in Earth orbit. That's not literally true, but sometimes it certainly seems that way. The reason is simple: the Pacific War showed just how dangerous open warfare in orbit can be. No one wants to repeat that mistake, but it's impossible to avoid national conflicts. Thus, Earth orbit has taken on plenty of old-style Cold War characteristics, with agents of nations, corporations, and other groups jockeying for advantage. Most of their operations are simple intelligence gathering, but the occasional assassination, kidnapping, or violent act isn't out of the question.

Journalist

A lot goes on in Earth orbit and someone has to cover it. Journalists can be found aboard most orbital stations, especially large and open ones like Columbia Station. In addition, the TEN Orbital Broadcast Center maintains a stable of journalists and videographers dedicated to getting the latest scoop for Marwari Digital's billions of viewers.

Mangliu ("floaters")

New orbital facilities are still being built and older ones are constantly being refurbished. Consequently, the need for human engineers and mechanics to work in microgravity hasn't subsided one bit. Mangliu tend to work in small, tightly knit groups, but they also possess a fair degree of autonomy and freedom of action. For that reason, rumors abound of floaters who've sold out to criminal cells or terrorist groups, which then use the engineers for their own purposes. The mysterious destruction of a PRA defense platform in 2094 is attributed to Mangliu co-opted by the Chinese during the construction of the platform.

Memetic Engineer

Like activists, memetic engineers are not well received in Earth orbit. This isn't to say they're not employed; they certainly are. It's simply that few groups acknowledge their desire to spread friendly memes throughout Earth orbit. However, both the OAA and CIPS have employed memetic engineers in an effort to defuse tensions. Since the conclusion of the Pacific War, the need for these people has increased considerably -- as have the salaries they can command.

Military Officer

Military officers are rarer than aerospace pilots, but they're still an important presence in Earth orbit. Because of the use of bioroids and cybershells by most Fourth and Fifth Wave militaries, not all "military officers" are actually employed by national governments. A lot are actually corporate security personnel, many of whom protect their employers' holdings in orbit. Whoever employs them, military officers are usually in a state of constant readiness. Who can tell when a minor incident will flare up into full-scale war?

Missionary/Chaplain

Considered memetic engineers by the transhuman age, these clerics can be found wherever there is a large concentration of human beings. Certain religious groups, such as Buddhism, Islam, and the Roman Catholic Church, have the largest presence in Earth orbit, but others

can be found as well. They serve many purposes in this region of space. Some Jesuit priests, for example, maintain the Vatican's orbital observatory, *Galileo*, while Sunni imams deal with the thorny question of which direction Mecca can be found when one is above the Earth's surface.

Nano-ecologist

Nanotechnology has made life and business in Earth orbit possible. Thousands of nanofacs and related installations churn out products for humanity's billions every day. Microbots and mites swarm inhabited installations, performing functions that no human being cares to take on. Plus, the ever-present danger of nanotechnological weapons and terrorism make the need for experts in the field of great value. Nano-ecologists deal with the expected and unexpected consequences of living in an environment saturated with tiny machines. Although not a glamorous job, it's an absolutely necessary one.

Pharmer

Genemod animals and crops are raised throughout the solar system, including Earth orbit. Vast agricultural stations, like AD-Michaelson Station, provide food for orbital communities and the Moon. They employ hundreds of pharmers to oversee this critical operation.

Scientist

Earth orbit is a region ripe with research of all sorts. Many scientists are employed by corporations and governments, both of which seek to develop technologies, like molecular nanotechnology, that could usher in yet more advances in scientific understanding. Others work for universities and research institutions, whose interests are similar. Whoever their employer, scientists take advantage of the unique characteristics of Earth orbit and tailor their experiments accordingly. The usefulness of vacuum or zero gravity cannot be overlooked, which is why many scientists use specially designed facilities where these conditions can be more fully implemented.

Terrorist/Guerilla

Terrorism is big business in Earth orbit. If nothing else, this region of space is jam-packed with installations from nearly every nation and organization on the Earth. In addition, they're much more vulnerable to attack than their equivalents on the planet's surface -- and make a much better statement if destroyed. Over the decades, terrorist attacks against orbital installations have occurred many times. The possibility that they may occur again has only added to the tension felt in the region. Since the Pacific War, most orbital facilities have been stepped up their security measures, concerned that terrorists employed by the TSA or another

aggrieved nation may decide to strike a blow for their cause by detonating a nuclear or releasing a nanovirus.

Tourist

Tourism in Earth orbit is not as big a business as it is on, for example, the Moon or Mars. Most travelers pass *through* orbit rather than lingering here for any length of time. Nevertheless, some installations, like Columbia and Taiko Stations, are significant enough to get a steady trickle of tourists. The same is true for places like the Auremonde-Hilton Orbital Hotel and the *Galileo* Orbital Telescope Array. Although tourists aren't the most interesting character types, they're not without dramatic possibilities. They make good foils in security force campaigns and can be placed in danger in military or intelligence-based games.

Adventure Seeds and Campaign Outlines

Life in Earth orbit presents many possibilities for *Transhuman Space* campaigns. Here are a few examples that utilize the setting and its many elements:

Crusaders

The characters have taken up a cause, whether it be a patriotic one or one based on a favored meme, and they seek to promote it through the course of the campaign. Earth orbit presents a unique opportunity to take up this sort of game, as there is a constant interplay and rivalry between different factions and ideologies. If the characters aren't careful, they could spark a diplomatic incident -- or even a war. *Transhuman Space* is all about the power of ideals to change the world; this campaign type brings that fact home.

End Times

The orbit of an old facility is rapidly decaying after decades in service. There's little chance of correcting the problem before the facility burns up in the Earth's atmosphere. A massive evacuation procedure is undertaken and the characters can become involved, either as part of the "official" evacuation or the criminal one that's salvaging parts and other items before the facility is destroyed.

Escape

Many human beings have fled the Earth because they deem it irrevocably damaged or an impediment to their growth into something more than human. For these people, Earth orbit offers a chance to view events on the planet from afar, without being bound to it. It's also an

opportunity to create a new kind of society that isn't caught up in Earth's increasingly stratified and orderly ways.

Ghost in the Machine

The characters stumble upon evidence of a criminal cell engaged in kidnapping people and braiipeeling them to create active mind emulations for use in cybershells. Their reasons for doing so are unknown, but their choice of kidnapping only military personnel suggests they have an interest in violent action against orbital facilities.

Freelancers

This type of campaign takes advantage of the overlapping jurisdictions and tense situations of orbit. The characters are classical "men without a country." They're not bound to any one nation or group and move free from place to place. They use their footloose status to work for whoever is willing to pay for their services, which can be any one of many groups. This type of game is perfect for players who enjoy variety and like their characters to avoid being tied down to a single locale for any length of time. Freelancer games also take full advantage of the diversity to be found in Earth orbit.

Phone Home

A research scientist from the *Galileo* orbital telescope has disappeared and the characters must find her. She went underground after she discovered what she believes is evidence of extraterrestrial communications from Tau Ceti. Her concern is that her employers -- the Catholic Church -- as well as corporations and national governments want to suppress this information or use it for their own diabolical ends. Whether she's correct or just a victim of the alien contact meme is up to the GM.

Satellite Theft

A terrorist group wants to strike a blow against the United States, but they don't have the means to achieve their end. That's why they've decided to steal a satellite from LEO and take its nuclear reactor. They plan to use the reactor's fissionable materials to create a bomb -- that they'll use against Columbia Station! The character can become involved either to aid or hinder the terrorists' plans.

Slave Revolt

The characters encounter a bioroid of an unusual design that shows a high degree of

autonomy and cognition. The bioroid has escaped from the Weiguo Orbital Correctional Facility and is now seeking allies in freeing his fellow rogue bioroids. The rogue is extremely thoughtful and well spoken, belying his violent nature. His only stated interest is in freeing the others held in Weiguo, but the fact is that he wishes to wreak havoc on his Chinese captors. He says nothing of the events that led to his own incarceration and plays up the "oppression" he's suffered at Chinese hands. Should the characters become involved, they'll soon realize the bioroid is a cold-hearted killer without any concern for human life -- whatever form it takes.

The Hilton

The Auremonde-Hilton Orbital Hotel is an excellent meeting place for all sorts of illegal or unscrupulous activities. Its mysterious ownership has no problem with criminals, terrorists, and revolutionaries using the hotel for rendezvous. Add to that the strange clientele of dilettantes and wealthy eccentrics and the hotel becomes the perfect locale for a surreal espionage adventure.

3 The Junk Cleaners

Some people would say that the Junk Cleaners are not a "group" at all. It's certainly true that they have no single shared base, employer, or motivation for their activities. And yet, *they* mostly see themselves as a group. They have a fairly clear shared self-image, which leads to mutual solidarity and support; they are also recognized as a distinct category by others.

In other words, there is a Junk Cleaner group meme. This has been noticed by many students of memetics, and the Junk Cleaners themselves are used to receiving communications and even personal visits from academics keen to study the formation and evolution of this memetic cluster. It has become something of a standing joke among them, and some make a point of studying just enough memetic science that they can confuse these visitors, or lead them into seemingly simple conversations that suddenly turn on the vexed academic question of the validity of any "field" observations of a memetic carrier-group whose members are fully aware that they are being observed, and of the possible distorting effects on memetic evolution of this phenomenon.

What the Junk Cleaners *do* is keep Earth orbit clear of dangerous inactive man-made objects, so far as possible. Because a completely "clean sky" is impossible, they also work to track and record inactive and active satellites and debris. Many are employed by a commercial organization, SDR Inc. (Satellite Debris Removal); others are employed by other corporations or government agencies, usually working to ensure the safety of specific satellites or stations; a few are independent operators, taking small short-term "clean-up" contracts and searching out saleable salvage (which either contains valuable materials or possesses historical or curiosity value).

"Junk Cleaners" is simply a nickname; other terms for this occupation include "Junkmen," "Vacuum Cleaners," "Orbital Sweepers," and equivalents and jokes in dozens of other languages. Official statements usually talk about "salvage teams" or "safety teams."

History

The Junk Cleaners exist to solve a problem that was recognized as potentially important not very long after the beginning of space flight. When an object is placed in orbit around the Earth, it stays there, until something moves it. Objects in low orbits encounter friction with the tenuous fringes of the Earth's atmosphere, which causes their orbits to decay until they fall to lower levels, meet even more friction, and either burn up or crash. But this can take anything from minutes to years, and objects in higher orbits are effectively there forever. Worse, fragments from destroyed vehicles (especially those destroyed by explosive motor failures), objects "dropped" by human space-walkers, and whole upper stages of old booster

rockets (especially those which suffered guidance system failures or other accidents which prevented them from either re-entering or going further, as planned), are just as capable of remaining in orbit as satellites designed for the purpose. The problem is, while space may be infinite, the volume defined as "Earth Orbit" is finite, and could eventually fill up with enough junk to make major collisions inevitable. Such collisions are very likely to be catastrophic, and may make the problem progressively worse, through a "cascade effect"; see the box-out, p. 00.

The Dangers of Debris

"Earth Orbit" already contains enough material -- mostly man-made -- to create a statistically significant danger of collision for vessels or satellites. The threats that this implies are serious. Furthermore, the problem is persistent. Objects left in orbits below 400 miles will normally fall back to Earth within a few years, but at 500 miles, the time becomes decades, and debris left above 600 miles will normally continue circling the Earth for at least a century.

Collision Damage

Most obviously, collisions cause damage. For example, in a circular orbit with an altitude of 500 miles (a good working LEO height), a satellite is moving at around 16,650 mph relative to the Earth; at 1,000 miles, that becomes 15,800 mph. A collision between two such satellites is sure to be at a significant fraction of these speeds, will *probably* be at a rather higher net speed, and if head-on, may effectively be at twice these numbers.

The damage caused by a collision depends on the size and density of the debris, the impact velocity, and numerous factors which dictate the exact nature of the event. However, as a rule of thumb, it can be determined for **GURPS** purposes by finding the average diameter of the object in millimeters, then multiplying by 5 to get dice of damage. (As with weapons, for large numbers, divide the number of dice by six and multiply the number rolled by the same amount.) So a 0.1 mm speck will do 1/

2d damage, a 1 mm flake will do 5d (averaging 17.5 points of damage, with a maximum of 30), a 10 mm object (say, a bolt) 6dx8 (averaging 168 points), and something averaging 100 mm in diameter (probably a recognizable component of a large rocket, or perhaps even a complete micro-satellite) may cause as much as 6dx83 (average 1743).

Collisions are in fact very frequent, but most involve very small debris particles (or micrometeorites), which lack the energy to penetrate even TL7-quality spacecraft shielding. Still, older stations and satellites are invariably scarred and pitted by thousands of small collisions; the most obvious problem is usually that view-ports and camera lenses become chipped and fogged. Delicate, large structures such as older-style solar panels and radiators often suffer significant minor damage, degrading their efficiency over years or decades. Slightly larger collisions are rarer, but much more problematic.

The Cascade Catastrophe

But the dangers do not end with the possibility of a direct collision with any given piece of debris. The potential danger is that all collisions, whether between working or inactive objects, tend to throw off multiple fragments -- all moving at orbital velocities. Thus, the more likely collisions become, the more fragments there will be in orbit, increasing the problem further. The problem will accelerate *even faster* than the rate at which civilization adds to the orbiting junk-pile.

In the late 20th century, it was realized that this could theoretically lead ultimately to a "Cascade Catastrophe," in which fragments from collisions suffered further collisions almost immediately, until the entire of LEO was filled with small, deadly, fast-moving fragments. Pessimists predicted that eventually, low orbit, and hence effectively all of space, could be rendered uninhabitable.

Mathematically, they were correct, and while they disagreed on exactly when this might have become inevitable (their mathematical models had to include a lot of debatable assumptions), the fact that space travel is possible in 2100 is only thanks to a number of factors. Among the most important are the active measures which the Junk Cleaners embody.

Confronted with this threat to the viability of their business, agencies and companies with an interest in space began studying possible ways to clean up LEO as early as the late 20th century. Meanwhile, a series of international agreements, culminating in the Revised Outer Space Treaty (see p. xxx00), addressed this and related problems of "crowding in space."

The very worst late-20th-century predictions as to the dangers of junk, and especially the possible Cascade Catastrophe, proved unfounded, and early plans for dealing with the problem remained mostly on the drawing board due to bureaucratic and corporate inertia. Still, some measures had been taken since the beginning of the 21st century (albeit mostly

negative debris-prevention schemes rather than clean-up efforts). But by the time that the Revised Treaty was negotiated, insurance companies were seriously threatening to withdraw from the burgeoning space business due to accelerating payout rates and loud warnings from their risk analysts. It was clear that some serious, continuing response was required. Part of this involved attempts of varying effectiveness to control the creation of junk; another part was the creation of organizations to deal with the problem actively.

COTS and SDR Inc.

Technically, this became the responsibility of a new international body, the Committee for Orbital Traffic Safety, but the COTS was never more than a diplomatic shell which channeled funds and negotiated contracts on behalf of the signatories of the Treaty; today, it exists only as an electronic address and a list of mid-ranking diplomats who have never met in person. Its first act was to issue an open invitation to tender for the task of controlling the debris problem. The winner of the contract was a consortium of space-related businesses which eventually became SDR Inc.

Incorporated in 2029, SDR was originally mostly a holding company, with large shareholdings in the hands of as many as seven or eight parent companies in several different countries. At the time, its head office was in Luxembourg, while its craft actually operated out of various spaceports, including Cape Canaveral and (increasingly) Quito. They were initially managed by subsidiaries of the companies which owned SDR, but eventually, the combined company developed its own identity, and assembled a small fleet of specially-built shuttle-type craft and unmanned, automated satellites. SDR had a fairly tight budget, but had to employ the best technology to meet its commitments; for example, it rapidly adopted laser launch technology in the early 2030s.

Commercial Considerations

Transcribed from the virtual reality brochure issued by the Tartessos Low-Earth Orbit Luxury Resort, 2099:

"Any micrometeorites or space debris that might endanger the hotel will be identified and eliminated by our Concierge-class guard vehicles long before they become a concern to you or to us. We guarantee that you will not only suffer no annoying puncture alarms, but that the station will not be obliged to perform any evasion maneuvers during your stay. Our promise -- no motion sickness. And your view of Earth will be through crystal-clear, unfogged diamondoid windows."

A series of commercial deals, transferring holdings in SDR between different "parents" on

managerial whim, mostly served to give the company's employees a stronger sense of corporate identity than of loyalty to any original employers, and by 2042, the running of the company was almost entirely in the hands of a managerial board; shares continued to be owned and traded by other organizations, but those others have no more *emotional* claim on SDR's loyalty than anyone else. In 2049, SDR's headquarters transferred to the newly-built Lammergeyer Station, in LEO, by which time, the almost half of salvage and clean-up operations were already being handled by manned orbital craft with no re-entry capability.

In 2058, SDR scaled its ground-based operations down to a handful of commercial offices, and its shuttle fleet was effectively reduced to a half-dozen supply craft actually based on Lammergeyer Station. By this time, several rival operations, most of them with just one ship each, were already active, but SDR professed not to feel threatened; its record and relations with the COTS remained good (cynics said "cozy"). In truth, its managers were happy enough to sub-contract, and its employees had decided that there was more than enough junk to go round.

Dangers to Spacecraft

Typically, a ground-to-orbit shuttle has DR 20-30. This means that it can withstand most impacts with objects up to 1 mm, though the occasional unlucky incident with something that size might leave a shuttle stranded in orbit for several days, while the crew seal the puncture and triple-check hull integrity. Shuttles must avoid much larger objects. Most stations and substantial spacecraft have DR 100; their crews are nervous of objects in the 5 mm size range, which can sometimes penetrate their hulls, and *have* to respond actively to anything larger. Furthermore, even robust craft may have external equipment -- cameras, manipulator arms, radiators, sensors, etc. -- which may be at risk from small debris. There is also significant danger to micro-satellites, and to astronauts performing spacewalks in anything but cumbersome armored suits.

Large impacts, with anything up to full-sized defunct spacecraft, could totally destroy even the most advanced vessel, but these are highly improbable. All else aside, such large objects are usually recovered quickly when they break down or complete their missions, and are routinely tracked and catalogued.

Damage Prevention

Apart from linking their navigation systems to databases of satellites and known large debris, spacecraft in LEO routinely use their radars to track debris; computers, often dedicated systems on craft purpose-built for this environment,

decide whether to maneuver away from possible impacts, and sometimes even control lasers that can either vaporize small fragments or "deflect" them by vaporizing part of their surfaces. The distance at which such a system can detect a problem is, of course, related to the power of the radar and the size of the object involved.

To determine detection range with *Transhuman Space*-era radars, find the object's size modifier from the Size and Speed/Range Table on p. B201, add the radar system's scan rating + 10, and convert back to a distance Size and Speed/Range Table. For example, a 10 mm object (perhaps a stray bolt from an old space station) is about 1/2" in size, giving a modifier of -12, while a medium radar has a base range of 5,000 miles in vacuum, equivalent to a scan rating of 33. This gives $33+10-12 = 31$, giving a detection range of 200 miles.

Extrapolating the table downwards, a 1 mm object has a size modifier of -18; with the same medium radar, the calculation $33+10-18 = 25$ gives a detection range of 20 miles. A 0.1 mm speck has a modifier of -24, giving a detection range of 3,000 yards (about two miles). Smaller objects are rarely considered worth tracking.

A closing speed of 16,000 mph is equal to just under 4.5 miles per second, so a vessel with the system described has over 40 seconds to respond to the danger of a 10 mm object -- less given higher speeds, but usually plenty of time to move out of its path with a 0.1 g thruster burn, or to aim a laser to vaporize or deflect it. Even 1 mm objects can usually be dealt with quite easily by automated systems, if the crew prefer to be cautious. However, in some debris-prone orbits (especially a few especially crowded areas), crews of lightly-protected ships may become used to their computer triggering numerous "evasion burns," and motion sickness may become a real possibility.

All this said, there is always a worrying "danger range" of object sizes and velocities which are not *totally* impossible and which could cause life-threatening (or at least mission-threatening) damage. Objects in extremely elliptical orbits are especially problematic, as they are harder to catalogue and may have very high velocities when passing through the LEO region at perigee; note that very high speed means both increased damage *and* decreased available response times. Experienced spacers offered work in LEO invariably check the proposed craft's radars and rapid-reaction maneuvering capability.

This situation, in essence, remains strikingly unchanged in 2100, except that the orbital salvage and clean-up industry has grown from a minor curiosity to a major, if unglamorous,

field of work, and the "independents" now make up over half the business. LEO is crowded to the point of overload, and a significant part of SDR's work is now monitoring satellite launches and orbits and funneling the information through to any other body that needs it. Use of SDR's encrypted data feed, while not expensive, is not free, but most users consider it worth everything they pay. Because it is the only body that has ever gone to the trouble of setting up the full sensor system and data collation operation that this requires, SDR remains the most important operator in the field, but the knowledge that several governments and corporations could match it with a little effort keeps SDR's prices down.

(Incidentally, SDR's debris database is *large*. The company is required by contract to endeavor to list any object with a mean diameter of 2.5 mm or more with an orbit that passes within 1,000 kilometers of the surface of the Earth, and also some smaller objects with exceptionally high kinetic energies, according to a complex formula. This means that the full database describes over 200 *million* objects, with an index of how easily they can be detected by radar, orbital details, an estimate of diameter and mass, and in a minority of cases, notes as to probable or known origin. Smaller objects, although potentially dangerous to many craft, are simply too numerous, and too susceptible to orbital changes caused by solar radiation pressure, to catalogue comprehensively. SDR can provide short-term tracking data for some of them, but estimates place the number of potentially identifiable human-made objects in Earth orbit at well over a billion.)

SDR operates a fleet of thirty-four manned orbital vehicles, five shuttles, and over a hundred automated monitoring and communications relay satellites, most of them with maneuvering capability. Thanks to its size and history, SDR has developed a relatively stodgy image; it is seen as relatively bureaucratic and dull, with more interest in shuffling databases than in salvaging forgotten 2030-vintage spy satellites or intercepting fast-moving debris fragments before they can perforate orbital hotels.

However, the truth is that SDR pilots and operational experts are as capable and shrewd as most other Junk Cleaners; the idea that the others are somehow "flamboyant" disregards the essentially cautious nature of the business, which intersperses moments of drama with long periods of routine.

Smaller Salvage Companies

Still, other companies, which like to remind SDR that it does not have any sort of legal monopoly, do at the very least take the role of multiple Davids challenging the Goliath of orbital salvage and protection. The last time that the COTS seriously considered awarding its primary contract for keeping LEO to a basic level of safety to anyone else was in 2084; some observers feel that another challenge may be due soon, if any conglomerate can put together a serious bid. The problem is that the COTS contract demands that the holder remove *all*

dangerous debris from certain orbits, however dull or valueless (or dangerous); while it pays quite well (from funds paid by signatories to the Outer Space Treaty), a challenger would have to assemble a substantial infrastructure. What might be slightly more likely would be for the contract to be split at some point in the future, with SDR and newcomers covering different altitude bands. A serious challenge on these lines might cause SDR staff to lose some of their easygoing manners.

Contracts and Sub-Contracts

Conversation on an LEO research station, June 2100:

"Radar shows large-diameter debris coming our way, sir. Highly elliptical orbit, so it's not in the SDR database."

"Don't worry, we have a contract with A and H . . . there we go, their platform just killed it."

"Hey, that was a zap from a Pakistani SDF platform!"

"Yeah, they earn some extra cash subcontracting out to A and H. . ."

In the meantime, their rivals concentrate on specialist contracts, either salvaging specific non-functioning satellites or guaranteeing absolute safety for specific stations. This leaves them with a slightly more glamorous image. The largest, Albert & Haraldt GmbH, has a dozen orbital craft operating out of *Station Lévité Industrielle*, one of the four manned LEO stations for which they have a safety-guarantee contract. Few others have more than three or four craft to their names; exact numbers and fleet sizes change from week to week, and even day to day.

Freelance Junk Cleaners

With space now accessible to moderately-funded private operators, the salvage and junk elimination business has become an open market. Small-scale operators, with a single ship each, include some former SDR employees who have convinced some corporation, government, or state to back them, along with spin-off projects backed by other space-going enterprises and a couple of Duncanite crews who have decided that their differences with anyone on Earth are less serious than their trouble with someone back home, and migrated here *from* the Belt.

The Legality of Debris

The clauses of the Revised Outer Space Treaty relating to the *creation* of orbital debris are a compromise between the need to control the amount of junk and commercial reality. Some factions would seriously like to make every organization operating in space liable for everything they cause to be in orbit, even including objects launched before the treaty was negotiated, but this is generally regarded as not only unenforceable, but too extreme in principle. A slightly less excessive approach would require that every object placed in orbit should have a demonstrable capacity to de-orbit itself -- i.e. to cause itself to re-enter the atmosphere and burn up -- at the end of its useful life, or that it should be recovered by its owner. The former option is simply too expensive -- it would demand that every cheap satellite should include a fairly substantial motor -- while the latter, which seemed ludicrous in the early part of the century, has become at least theoretically justifiable with the growth in low-cost space flight and routine human operation in space.

At the other end of the negotiating range, some groups (including, in 2100, some, though not all, nanosocialist states) argue that "space is free," and that attempts to impose restrictions on its use represent an attempt by established Fifth Wave powers to close off an area which they currently dominate thanks to their own earlier unrestricted activities. A less extreme faction, made up of an uneasy alliance of moderate nanosocialists and mid-sized corporations, argues for minimal restrictions based on "proven" safety issues.

The working compromise embedded in the Treaty has survived because neither extreme faction can muster enough support to change it, and most people feel that it works tolerably well. It is based on the concept of liability for any damage caused, and places a responsibility on courts and arbitrators to determine, not only the origins of an object which caused any damage, but also the extent to which its builders attempted to minimize risk. For example, an LEO satellite which was designed to de-orbit itself but did not do so due to systems failure is considered less of a source of culpability than one which was simply designed to drift. Originally seen as a "cop-out clause" that left corporations free, in practice, to do what they liked with little chance of anyone proving their guilt, this rule has been enforced with increasing effect as investigators gained better access to space flight, tracking systems, and databases. (In fact, several organizations which originally supported it now want it moderated.) The Junk Cleaners, who gain regular contracts for the removal of old satellites and other junk, like it just fine.

An ancillary clause mandates that geostationary satellites should either be removed or should perform "graveyard burns" (see p. 00) at the end of their

working lives, while older international treaties (periodically revised) govern spacing in geostationary orbit and related topics. Recent concerns about the "Graveyard" becoming significantly crowded may lead to changes here. More importantly, another clause extends various conventions governing maritime salvage into space; while there are sometimes disputes, it is now established law that, if an unmanned satellite is demonstrably no longer under control, anyone who recovers it gains quite extensive salvage rights, and anything unused and uncontrolled for thirty years belongs to whoever recovers it.

The life of a freelance in LEO is uncertain, but not necessarily profitless, given a little ingenuity and commercial skill. The most reliable source of income is recovering defunct or malfunctioning satellites at the request of their owners, either for repair or to avoid liability for any damage they might cause as debris; it is also possible to find good paying work removing specific catalogued debris that might endanger some new project, or to obtain short-term contracts covering for a larger enterprise whose vehicles have suffered unexpected malfunctions. Less reliable, but most colorful, is speculative object recovery; scanning the catalogues for large objects, often of uncertain origin, picking them up, and then determining whether they have scrap value or can be sold on to collectors or historical researchers. This sort of thing is a last choice for most sensible Junk Cleaners, being rarely profitable, occasionally dangerous (old satellites often have volatile thruster fuel still in their tanks, and military devices are very occasionally booby-trapped), and often expensive on fuel, but there are enough moderate-sized bonanza finds every year to keep people interested.

Location, Location, Location

Today, Junk cleaner operations are mainly concentrated in LEO, where the density of active and inactive objects is by far the highest and hence the need for them is most extreme. A secondary area of relatively high activity is geostationary orbit -- and also just above, in a zone known to the Junk Cleaners as the "Graveyard"; see the box-out, p. 00, for an explanation. Junk cleaners working in this higher region are more concerned with intact (if defunct) satellites than with fragments; they receive occasional contracts to locate and remove specific units in actual geostationary orbit, and between times, they hunt down and recover whatever they can find in the Graveyard. Nonetheless, there are some real dangers of collision with fragments even here. A few Junk Cleaners, mostly freelances, occasionally operate in other orbits or the Lagrange points (not just L5, despite popular stereotypes), or virtually anywhere else in the Earth-Luna system if they receive a contract or identify a wreck of potential interest. Speculative work is the main reason why Junk Cleaners may be found away from LEO, geostationary orbit, or L4 or L5.

Geostationary Concerns

Geostationary orbit should, some people assume, be relatively clear of junk; after all, at an altitude of 22,240 miles, there is nearly 165,000 miles of circumference to play with. That, however, underestimates the sheer *usefulness* of this specific orbit. For more than a hundred years, governments, communications companies, television broadcasters, and others have been jockeying for use of this region.

In 2100, international agreements assign five-year licenses for use of "slots" of 0.05° , in which a licensee may place up to six satellites at their own risk. In the event of a collision between any of these satellites, the licensee becomes liable for all consequent damage to other satellites and craft, and must make "reasonable efforts" to clear up any debris. While penalty clauses are rarely invoked, they theoretically permit the withdrawal of *all* GEO slot licenses from a licensee.

A slot thus consists of just 23 miles of that circumference; as even geostationary orbits are not perfectly stable, continuous active measures are required simply to remain in a slot, let alone to minimize the risk of collisions with other objects sharing the same slot (and the odd fragment of debris left over from past decades). Furthermore, many communications satellites receive data through tight-beam links; if they are too close together, or if beam focusing systems fail, one may impinge on a beam intended for another, suffering interference or even reacting in unpredictable ways. Geostationary satellite operations require continual monitoring by dedicated AIs, and sometimes, active diplomacy between users.

To an extent, problems can be ameliorated by placing satellites in "inclined" orbits, rather than directly above the equator. They still pass through the plane of the equator twice per day, but a little careful traffic management can deal with any problems arising then. However, this is a solution of limited appeal; from the surface, the satellite appears to follow a figure-eight path through the sky rather than remaining truly stationary, which is supposedly the point of buying a GEO slot. However, the past use of inclined orbits by some operators adds to the complexities of traffic management and salvage in the region; a few major Junk Cleaner speculative finds have involved old objects in radically inclined near-geostationary orbits.

Graveyard Burns

Because even inert geostationary satellites can be a problem and a danger to others, international agreements on the use of space have long required that

they be removed from that orbit at the end of their working lives. Before space flight became affordable enough that the owners could simply send or hire someone to fly over and pick the satellite up, this was achieved by retaining a small amount of maneuvering thruster fuel to the end of the satellite's life, then using it to boost the spacecraft into a slightly higher orbit, where it would be out of the way. These so-called "graveyard burns" left a large number of early communications satellites in under-documented orbits beyond geostationary, where Junk Cleaners now scavenge. The scope for simple materials salvage here is generally too thin to be large profits, but many of the satellites recovered are intact historical curiosities, for which museums and academic institutions are sometimes prepared to pay a decent fee.

In all cases, Junk Cleaners require a base of operations; it would be uneconomic for them to operate in vessels large and well-equipped enough for long-term occupancy. SDR crews have Lammergeyer Station, Albert & Haraldt have *Station Lévité Industrielle*, and smaller operators may rent space in general-purpose industrial stations or even small "soda can" habitats -- though few crews find that tolerable or desirable. A few independents specialize in working the Lagrange points, and are based in the large stations there.

Junk Cleaner Culture

Despite the variety of their backgrounds and employers, the Junk Cleaners have evolved a distinct culture of their own -- a set of memes, assumptions, and prejudices. They also have slightly atypical demographics.

To begin with, a disproportionate number of Junk Cleaners are unmodified or only lightly modified humans. This is not glamorous work, and there are relatively few genetic adjustments available which are particularly suited to making it easier. Those which make space travel safer and cheaper are an exception, but given their fairly regular access to large stations and, if necessary, the Earth itself, even these are merely strongly recommended rather than mandatory for Junk Cleaners. Thus, the ingenuity and investment of gene modifiers and bioroid builders tends to focus elsewhere. Furthermore, operating in a fairly high-risk environment, Junk Cleaners tend to favor proven technology over untested novelty, and having been in operation for most of the 21st century, their average age is a little higher than that of many space-going groups.

All of which tends to give them a reputation for crusty conservatism and mild technophobia. In truth, however, this is vastly exaggerated. No-one survives and prospers for decades in space without developing a healthy liking for technology as well as a detailed grasp of its operation, and the Junk Cleaners know their tools very well.

Some Noted Junk Cleaners

Jutta Haraldt: Born in 2021, the co-founder of Albert & Haraldt was diagnosed as suffering incurable levels of cumulative radiation damage -- the consequence of a lifetime of space operations -- in the 2080s. She underwent uploading in 2092, and her ghost now runs on a very-high-security, high-speed computer system at an unknown location somewhere on Earth. She continues to supervise her company's operations closely if sometimes erratically, sometimes even teleoperating small orbital vehicles, and her chosen image -- a slightly idealized depiction of herself at 50 -- is a familiar sight among Junk Cleaners.

Dmitri Volkhovich: SDR's chief of operations, based full-time on Lammergeyer Station, is the son of Russian immigrants in Canada; his accent is straightforward Canadian. Aside from being every SDR pilot's supervisor, he often handles low-level negotiations with other groups. Slim, blond, and pale, he is widely seen as something of a cold fish by Junk Cleaner standards, but he is highly reliable and honest with his employees. He also seems to know the orbital characteristics and current position at any time of every large object in LEO, and those who know him swear that he does not use any sort of AI for this.

Lucas "Glove" de Andrade: Originally an SDR employee, Lucas de Andrade has been freelance for the last thirty years, and is now probably the best-known and most widely admired Junk Cleaner. It is generally assumed that accumulated savings must have made him rich by now, and there is much speculation as to why he has not long since retired. Cynics suspect that he is addicted to fame and admiration; he certainly seems to enjoy his status. In 2079, he recovered an unidentified spacesuit glove from orbit, and legend insists that this was the glove famously lost by American astronaut Edward H. White in 1965, despite the fact that White's orbit at the time would mean that *his* glove must have burned up within days. De Andrade's find has since been lost; details of how are unclear.

Samantha MacNamara: Senior partner and computer systems officer of a freelance Junk Cleaner crew which has recently expanded into a two-ship company, MacNamara is a Metanoia upgrade (see p. xxx00) who appears to be determined to demonstrate that she can achieve success through *personal* talent and hard work, rather than "coasting" on her genotype's augmented IQ. Marginally workaholic and somewhat humorless, she nonetheless commands fierce loyalty from her junior partners, and is noted for turning up whenever

anything interesting and potentially profitable shows up in LEO.

All Junk Cleaner operations use extensive sub-sentient AI systems to track debris orbits and determine optimum responses, and most will adopt the most powerful current *proven* technology which they can afford. A few ships even have fully sentient AIs or ghosts as full crew members, and the vast majority of Junk Cleaners regard these beings as equals. There are no known bioroids in the business, and only a few each of Avatar *Tenjin* and Gilgamesh-series parahumans, but this appears to be a matter of historical accident. If Junk Cleaners are prone to prejudice, it is directed more against people who appear to underestimate the dangers and complexities of the orbital debris issue -- a category which includes some outer-system space operators and not a few Elfs and LEO station operators as well as many "planet-bound" humans.

But the Junk Cleaners' self-image is based much more on positive attitudes than on prejudice. The stereotyped Junk Cleaner is even-tempered and mostly treats poor traffic management or unreliable satellites as part of life; after all, they guarantee him employment. He has a dry sense of humor and a typical space-pilot's clipped, precise style of speech when "on duty." Not all Junk Cleaners live up to the stereotype in every detail (and outsiders may feel that the sense of humor often tips over into sarcasm), but it does reflect the nature of their lives. Although most quite enjoy their work, few would call it a vocation, and most aim to retire after a few years, or in the case of SDR employees, to move into "office" jobs. (Given that some of these involve telepresence operation of unmanned orbital devices, and almost all are on Lammergeyer Station, this does not necessarily mean that they want to get out of space.) A fair number transfer to other space-based work, if a good offer happens to come along; the Junk Cleaner meme is not particularly isolationist. This means that many spacecraft crews, throughout the solar system, include one or two members with contacts among the Junk Cleaners.

Junk Cleaner Character Template [95 points]

Attributes: ST 10 [0]; DX 11 [10]; IQ 12 [20]; HT 10 [0].

Advantages: 40 points from: Acute Vision [2/level]; Ally (infomorph) [varies]; Ally Group (crew) [varies]; Ambidexterity [10]; Claim to Hospitality (friends on LEO or L5 stations) [varies]; Comfortable or Wealthy [10 or 20]; Common Sense [10]; Composed [5]; Cool [1]; Deep Sleeper [5]; DNA Repair or Cell Repair Nano-Symbiotes [12 or 15]; Favor [varies]; G-Experience [10]; Less Sleep [3/level]; Light Hangover [2]; Luck [15 or 30]; Night Vision [10]; Patron (employer) [varies]; Single-Minded [5]; Tenjin Biochemistry Nano-Symbiotes

[2]; 3D Spatial Sense [10].

Disadvantages: -20 points from: Age [varies]; Attentive [-1]; Careful [-1]; Code of Honor ("Pirate's") [-5]; Compulsive Spending [varies]; Congenial [-1]; Dependents (junior crew) [varies]; Dull [-1]; Duty (employer) [varies]; Easy to Read [-10]; Greed [-15]; Intolerance (people who are sloppy about space traffic management and junk creation) [-5]; Miserliness [-10]; Nosy [-1]; Oblivious [-3]; Odious Personal Habit (full-time dry sense of humor) [-5]; Phobia (Demophobia or Squeamishness) [varies]; Sense of Duty (crewmates and/or employers) [varies]; Shyness [varies]; Staid [-1]; Struggling [-10]; Undiscriminating [-1].

Primary Skills: Area Knowledge (LEO) (M/E) IQ+1 [2]-13; Electronics Operation (Sensors) (M/A) IQ [2]-12; Engineer (spacecraft) (M/H) IQ-1 [2]-11; Free Fall (P/A) DX+2 [8]-13; Mechanic (chemical rockets) (M/A) IQ [2]-12; Piloting (high performance) (P/A) IQ [2]-12; Vacc Suit (M/A) IQ [2]-12; and +8 points applied to any one or two of these skills.

Secondary Skills: Computer Operation (M/E) IQ [1]-12; Electronics Operation (Communications) (M/A) IQ-1 [2]-12; First Aid (M/E) IQ [1]-12.

Background Skills: A total of 13 points in any of Accounting (M/H); Area Knowledge (GEO or L5) (M/E); Armoury (spaceship weaponry) (M/A); Astrogation (M/A); Bardic Lore (M/H); Carousing (P/A:HT); Chess (M/E); Diplomacy (M/H); Games (M/E); Gunner (Beams) (P/A); History (M/H); Law (M/H); Leadership (M/A); Merchant (M/A); Musical Instrument (M/H); Musical Notation (M/E); Piloting (aerospace or low performance); Savoir-Faire (Military) (M/E); Scrounging (M/E); Streetwise (M/A); Traffic Analysis (M/H).

Notes: This of course represents a human Junk Cleaner; Gene-Enhanced Human or Parahuman templates can be added if appropriate. Bioroids are very rare in this line of work, and Sapient Uplifts are unknown; there are some Junk Cleaner Digital Intelligences, which should be given skills from the list above and an appropriate shell or computer on which to run.

Junk Cleaners always need some kind of protection from radiation damage -- usually an appropriate Advantage, occasionally use of an unusually good spacecraft and a good reason never to go space-walking. Only those based on unusually large rotating stations can get by without protection against bone-calcium loss.

Personal Interests

While Junk Cleaners have their full share of private hobbies and concerns (limited only by what is feasible in space), many have interests specifically related to their work. Among other things, the community probably includes some of the system's leading experts on the history of space travel outside of academia -- and they combine this with practical experience. (Those who engage in speculative searches may be particularly knowledgeable, or merely particularly optimistic.) Many develop a taste for music, to which they can listen while working; when SDR determined that some styles had an undesirable effect on the moods of listeners, they surreptitiously introduced a memetic engineering program to minimize the ensuing risks, and most company employees are now long-standing devotees of a set of emotionally neutral "ambient" styles of composition and performance. Some smaller company employees and freelancers follow this; others defy fashion by deliberately cultivating tastes for eccentric styles of vocal music.

Relations With Other Groups

Junk Cleaners are not, for the most part, anything like as crusty and cantankerous as their popular image may suggest, but they are professionals with a certain amused attitude towards possibly-ignorant outsiders. They are, in general, happy to do business with almost anyone, respect competence, and are usually polite to anyone with personal power or wealth (which they tend to interpret as a sign of competence, or at least the mark of a potential employer). That said, many of them have ethical standards and ideals; it is perfectly conceivable for a Junk Cleaner to turn down good paying work because they despise the employer, although it is nearly certain that someone else will promptly take the job. What does reliably annoy them is lack of respect for either their work or the dangers of poor orbital traffic management. It should also be noted that the widespread Junk Cleaner dry sense of humor sometimes makes it hard for others to tell what a Junk Cleaner does think.

Junk Cleaners in High Orbits

While most Junk Cleaners operate in LEO, a few may be found in almost any part of Earth-Luna system space. The other region with a significant, if much more widely scattered, presence, is a few hundred miles from geostationary orbit upwards (the "Graveyard"). There are also likely to be a few groups operating in the L5 region at any time. Junk Cleaners met anywhere else will certainly be there for a specific reason -- usually with a contract to recover some specific object, just possibly because they have identified a specific possibility for valuable salvage.

GEO: Although geostationary orbit sees significant Junk Cleaner activity, not enough happens there to justify a permanent presence. However, reaching that orbit from LEO or L5 requires a significant boost, adding significantly to the cost of the job for chemical-rocket Junk Cleaner craft. Therefore, Junk Cleaners operating in the region are likely to have specific contracts, or to be pursuing profitable-looking ideas.

L5: The Junk Cleaner community around the L5 point is a mixture of short-term visitors working on contracts from wealthier local stations, longer-established professionals who specialize in sifting through the excessive quantities of low-velocity debris that have accumulated in this ill-managed region, and "locals" who have entered the debris-recovery business out of misguided enthusiasm or desperation. The latter range from fairly competent teams to disasters waiting to happen; "real" Junk Cleaners naturally regard the latter with concern or contempt.

Recovery Contracts and Hot Rumors: Junk Cleaners encountered in other orbits are most likely to be there because another party has offered them a contract to eliminate or recover some specific large object. Their equipment and skills (and availability) mean that they receive a fair number of such contracts, despite the fact that they often have to attach additional fuel tanks and even rockets to their craft in order to make the interceptions, and charge accordingly. Despite some popular fictions, they are highly unlikely to chase off into unusual areas because of a *rumor* of possible profit. Earth-orbital space has not yet become so wild and confused, or so heavily inhabited, that spacers can sit around in dark bars trading tales of lost satellites of gold and iridium. A well-documented historical record, backed up with precise orbital calculations, that passes review by an unemotional AI, might be another matter.

Both SDR and smaller organizations have a mass of business relationships with virtually everyone who operates regularly in Earth orbit, especially anyone who operates a station in LEO. (People who merely fly through this region tend to think of SDR simply as the company that sells them traffic-hazard information.) While, like any business relationships, these can turn sour, there is generally enough competition to keep everyone honest, and enough mutual respect to keep conversations amicable. There are a number of long-standing disputes and even feuds arising from contracts gone bad, but little that leads to more than verbal abuse or dragged-out court cases.

One category of organization with whom many Junk Cleaners have developed a cautious working relationship are the intelligence services -- especially military intelligence bodies -- of many terrestrial nations. This is both inevitable and inevitably problematic; a fair

proportion of the defunct objects in LEO and the Graveyard were once state-of-the-art military projects, and a few of them represent secrets that their builders still wish to keep. Junk Cleaners usually play safe in such matters; a simple "hands off" signal from a known government source will make most back away from any given object, although they may continue monitoring it quietly for a while out of nosiness. However, if the object represents a high risk to other active craft, they are likely to escalate the issue, quietly or publicly as seems most appropriate.

Any Junk Cleaner who seems unwilling to treat military satellites with this sort of minimal tact is likely to be warned off, quite strongly, by others in the profession; military organizations are usually willing to warn of possible dangers in specific areas, and to react promptly if asked for advice (or even sometimes aid in knocking down large, dangerous debris), but this relationship is built on a degree of mutual trust that took some time to establish. Early Junk Cleaner work lost several ships to military booby-traps before the threat of bad publicity, or of Junk Cleaners destroying anything that they didn't trust by the safest available method, started both sides talking to each other.

Spacecraft Technology in LEO

The Junk Cleaners are obviously not the only people operating in Low Earth Orbit and thereabouts, and in fact, much of the technology that they use is of types common in this area.

The obvious concern that dictates many of these choices is the danger of collisions with debris. A combination of international agreements and popular opinion among groups with influence in the space-traveling community leads to a strong preference for technologies which also minimize the risk of *increasing* collision dangers; Junk Cleaners tend to be the most forceful, even evangelical, on this subject, but most other people acknowledge that their opinions are valid (at least overtly, for the sake of good public relations).

First, given that large debris can be avoided if it is spotted in time, so ships in low orbit tend to have good sensor packages.

Second, smaller debris is enough of a danger that good armor is considered advisable. Vessels which are designed to operate routinely in high-collision-risk orbits, and especially purpose-built Junk Cleaner vessels, usually employ foamed alloy armor made of one of a specific set of alloys which have the lowest probability of throwing off fragments when damaged. Junk Cleaners usually err on the side of caution.

And third, some drive types are much preferred over others. The Revised Outer Space Treaty (p. xxx00) specifically prohibits technologies from LEO whose exhaust plume or failure dangers are seen as excessively dangerous; fission, fusion or antimatter propulsion. However, it also contains some rather loosely-worded clauses prohibiting activities which "substantially increase" the volume of debris in LEO or the Lagrange points. This is universally regarded as prohibiting deliberately setting off explosive devices (although small explosions "guaranteed" not to produce solid debris may just be tolerated); it is also generally taken to bar use of mass driver propulsion systems. In truth, this is rarely an issue; few people *want* to use mass drivers here. It has also been argued, usually as a hypothetical legal point, that reaction mass consisting of matter which will rapidly sublime to gas in vacuum, or a drive directed so that all of its "exhaust" reached the upper levels of the atmosphere and burned up, would be legal, but few groups wish to test the point. Thus, typical LEO ships use chemical rocket propulsion.

The rule is also generally taken to discourage the development of space-going microbot swarms or self-assembling satellite projects; given that low-cost laser launches might make this sort of thing very cheap, this prohibition is the subject of grumbling in some quarters. Conversely, Junk Cleaners and other LEO pilots have been heard to argue that a *serious* implementation of the principle would render half of all "microsat" programs (rightly) illegal. This part of the treaty is strongly supported by many such groups, and it is suspected that several would enforce it by informal means if necessary. There are no *proven* cases of Junk Cleaners arranging "accidents" for sloppy or cavalier spacecraft operators, but several of them "cleaning up" microsats whose owners regarded them as still active. . .

If a Junk Cleaner recovers something intact that proves to carry military markings, there will usually be a period of delicate negotiation leading to the object's being returned to its original owners in exchange for a fair "finder's fee." The threats that can be brought to bear by intelligence agencies are balanced by the assumption that the Junk Cleaner will have filed images and notes on the find somewhere safe but accessible to several different friends and police agencies, and again, both sides mostly recognize the benefits of tact. That said, Junk Cleaner finds have very occasionally triggered minor international scandals, and there is also some suspicion that some attempts at blackmail by greedy Junk Cleaners have been squashed with efficient ruthlessness by irate agencies.

Debris Elimination Technology

Junk Cleaner groups use a wide range of tools and techniques for eliminating debris. The

three basic approaches are capture, destruction, and de-orbiting.

Capture technologies involve manned or robot craft (usually the former these days) with clamps, robot arms, or crew operating in space suits. Junk Cleaners tend to insist that they should know approximately what they are attaching to before they start, studying their target from a safe distance and checking all available files; they will rarely touch military devices without specific assurances from the builders, and tend to be cautious of damaged rocket boosters. (Confronted with anything that even *looks* like an AKV, they will back off a long way and may even request a high-power solution from a helpful military platform, risks of fragmentation notwithstanding.) But caution aside, recovery work can be very profitable; many owners will pay well to have their property returned, and even without this, the scrap or historical value of an old satellite can be significant.

Destruction of dangerous debris sounds appealing, but obviously must be exceptionally thorough and reliable to avoid merely producing larger numbers of smaller objects. This means that it is mostly limited to small (sub-10 mm) debris; many Junk Cleaner ships and some LEO stations have low-power lasers for this purpose. Cautious Junk Cleaners prefer to take some time to assess the object first, to make sure that the effect is not likely to be that it fragments explosively.

De-orbiting techniques are mostly used to deal with relatively large objects of low value. The principle is to change their orbit so that they encounter significant upper-atmosphere air resistance, at least part of the time, which slows them and lowers their orbit yet more, until they fall into the atmosphere and burn up (or, in some cases, fail to burn up completely, hopefully crashing in a planned fashion in an uninhabited area). Stopping an object dead in its orbit, so it falls directly to Earth, is technically possible but pointlessly inefficient.

There are several ways of deflecting an object. It may be targeted with a laser from a particular direction, causing parts of the surface to vaporize. This produces an action and reaction, and hence effectively thrust. The technique is popular and effective, for deflecting debris from specific orbits even if it cannot be de-orbited. Again, cautious Junk Cleaners will analyze the likely consequences for a specific object before bringing their laser to bear; aside from the danger of fragmentation, it is very hard to predict the object's exact trajectory after deflection.

An older technique, used most in the early days of debris reduction, is the "foam sphere" system. A large ball of soft foamed material, many tens of meters across, may be set into an orbit opposite to those of a large number of small particles. If this is set up correctly, the particles hit and embed themselves in the sphere, which is thus slowed in its orbit and which eventually enters the atmosphere and burns up. Few problems justify this approach in 2100, but SDR and some other companies with an

LEO presence have the requisite equipment in storage.

Lastly, a rocket motor can be attached to an object and used to slow it down. The simplest version of this involves flying a manned ship up to the object, clamping onto it, then detaching and boosting away once it is set for re-entry; a safer approach involves unmanned, automated rockets, either cheap one-shot units with solid-fuel rockets or more sophisticated reusable devices. This technique is still fairly common, but is not used on anything like the scale of the middle of the 21st century, when small fleets of robot de-orbiter rockets operated almost autonomously in very low orbit.

Steptoe-Class Debris Recovery Vehicle

This is a typical Junk Cleaner vessel, capable of locating and tracking debris of almost any size and dealing with it in a variety of ways. However, it is *not* a small runabout. It has to be able to maneuver extensively between orbits, intercept fast-moving objects, and sometimes act as a "tug" to move large objects around, and being an LEO-legal design, it has to use a chemical rocket. It is also built to withstand moderate-sized debris impacts in the event of a miscalculation. Hence, it is comparable in size to many interplanetary craft, although most of that space consists of fuel tanks.

Its basic structure is as cheap and simple as requirements permit -- a cylinder with a heavy frame covered in foamed-alloy sheathing -- but it carries comprehensive sensors and adequate computers for its role. (Usually, one radar system is used to track a specific target while the other scans for unknown dangers.) It also mounts a pair of robot arms for manipulating smaller objects without the crew having to suit up, and a single laser, for debris destruction or deflection. Its built-in motors are entirely adequate but not actually excessively powerful; in the event of an urgent or long-range mission (intercepting a piece of debris before it collides with another and produces a shower of small fragments, say, or performing contract work in geostationary orbit), it is possible to strap on a set of auxiliary fuel tanks and even extra chemical rockets. Without these, the fuel tanks are good for 30 minutes of maximum thrust.

Steptoe-class craft routinely carry a crew of three, supported by basic sub-sentient AI systems; the usual roles are pilot, systems/communications operator, and operations engineer (responsible for assessing target debris, operating the laser or the robot arms, and most extra-vehicular work). A few manage with a crew of two (and more extensive automation); some carry four

people, with various task assignments, in cramped conditions, but this stretches the vessel's life support, which is only good for six man-days. Vessel names (if given) are a function of owner whim or company policy, with no consistency.

Other Debris Recovery Vehicles have more powerful rockets and better life support, for longer-range missions, and some have more powerful computers, permitting a sentient AI or ghost to act as a full crew member.

Subassemblies: Cylinder Hull (+5/+9).

P&P: 0.95 Chemical Rocket (HO), 2 Old Fusion Reactor (8 MW), 25 Old Fusion Core, 0.05 energy bank (450 MJ), 0.5 ksf Hull Radiator.

Fuel/End: 315 Light Tank (with HO).

Occupancy: Bridge only. **Cargo Spaces:** 10.

Armor (cDR) F RL B T U

Hull: 4/1.6 4/1.6 4/1.6 4/1.6 4/1.6

cPF F RL B T U

Hull: 1 1 1 1 1

Weaponry

1x10-MJ Lasers [Hull:FTB].

Equipment

Modules: New Basic Bridge, Small PESA, Medium Radar, Small Radar, Small Ladar.

[Robot Arms - details needed].

Statistics

Dim: 36'x36'x180'. *Payload:* 50.3 tons. *LMass:* 2318 tons.

Volume: 373.2 spaces. *Maint.:* xxx hours. *Price:* M\$xx.

HT: xx. *Hull Points:* xx [Hull].

sAccel: xxx G *RMC:* xxx *Burn End:* xx hrs

Burn Points: xx. *Delta-V:* xx MPS (x.xx AU/day).

aSpeed: -- *Stall Speed:* --

Luna

The moon has been studied since the first human looked up into the night sky with wonder. The first telescopes were turned to the face of the full moon to record the great lunar 'seas' and mountains. Until the turn of the 21st century, only twelve men had ever stood on its barren surface. Now there are over 250,000 settlers on Earth's satellite.

Selenology

Luna was once a part of the Earth, current theories suggests that a planetoid -- perhaps as large as Mars -- crashed into our planet and knocked a gigantic chunk of it into space. Luna is made up of lighter elements -- particularly oxygen and aluminum -- identical in composition to those that make up the Earth's crust. It does not have a heavy iron/nickel core that suggests it was formed after those heavy elements were drawn into other planetary bodies. In Luna's early history, it had some volcanic activity, lava flows created the dark marias and myriad tunnels and rilles that were once mistaken for seas and rivers of water. However, for millions of years, the moon has been a dead, desolate planet.

The other great process of Lunar evolution has been the billions and billions of meteors that have crashed into its surface. Without an atmosphere to burn up even the smallest meteors, the moon is constantly bombarded with both matter and energy. Meteors that have hit the moon have created the lunar highlands; thousands of overlapping impact craters and shattered rock thrown up by the force of enormous meteor strikes. A few moon rocks have even been found on Earth, probably the result of massive impacts that threw materiel from the moon out of its gravity well. Recent meteor strikes have pale colored rays - ejecta from the initial meteor impact that has fallen back to the surface. Tycho crater, whose rays extend halfway across the surface of the moon, is a young crater only 100 million years old. Older rays are worn away by constant micro-impacts.

One of the effects of large meteor impacts is the creation of jumbled terrain on the side of the moon opposite the impact site. When a giant meteor hits the moon's surface, the point exactly opposite the strike is the focus of seismic waves. The surface at the focal point jerks up and down as much as 10 meters. If a large meteor ever hit the moon again, there would be no safe haven for the thousands of people living there.

Microscopic meteors have slowly worn down every inch of the exposed lunar

surface and have created a sterile, sandy regolith which ranges in 10m in the maria to over 100m deep in the highlands. The sandblasting effect of micrometeors remains a serious problem for any manmade object on the surface of the moon.

Without either an atmosphere or a magnetic field, the moon is awash in energy from the sun, from the Van Allen belts and from particles that have traveled from stars halfway across the galaxy. This has seeded the moon with rare particles, such as H₃ and a grab bag of other unusual particles most of which have little commercial value. The moon is actually within the outermost effects of the sun's corona (like the Earth) and during periods of peak solar activity, failure of electronic equipment and interference with radio signals are not uncommon. Any surface habitation on the moon must shield both their electronic equipment and any people living there, which is why most lunar habitats are buried underground.

Water is incredibly scarce on the moon, found only in isolated deposits and probably brought in by meteor strikes. Aside from H₃, finding water is the big dream of every prospector and mining company on the moon.

Primeval Water

The moon was a part of Earth, billions of years ago. Though most of its surface has been completely transformed since that ancient separation perhaps in some crevice deep in the lunar highlands, traces of the primeval Earth survive. Such a trace, a bit of ice, might even contain long extinct bacteria or viruses. It would be the find of the century. A deadly, primeval life form might also mean the extinction of all modern life on Earth, should it get free.

A prospector turns up dead in Luna City -- robbed of the precious find he'd hoped would make him rich for life. An investigation into his death would turn up players from every major country, crackpot memes and Redjack assassins. With rumors spreading like wildfire across the moon and beyond, how long will the player characters have before this mythical primeval water is unleashed?

Moonshadow and Tourism on the Moon

Lunar tourism is the current hot topic on the moon. Miners and Luna City accountants argue with each other over beer and cappachino. Prospectors are fined every year for destroying tourist cybershells that have trespassed on their precious claims while Luna City and the LCCU struggle with the nightmare of scheduling bandwidth for visiting cybershells.

Space tourism began as early as 2001 and, when travel to the moon became reliable, it became the destination spot for the rich and adventurous. In those early years, lunar tourism was an 'extreme' adventure, potential visitors had to train for space flight, room and board were little more than freeze dried food and a bunk in the shuttle. The accommodations on the moon were extremely primitive. However, the moon is the only planet reachable without weeks or months traveling through space. Anyone who wanted a real adventure went to the moon.

Since then, tele-tourism has surpassed real time tourism in popularity and affordability. There are still tourists who insist on the real thing, but most people are quite content with a few hours of tele presence where their cybershells are guided through the more spectacular lunar landmarks and visit the Lunar Historical Center where Neil Armstrong's footprint has been sealed under quartz and is carefully guarded from vandalism.

Rabbits all dread the school season, where dozens of kids, lead by their geology or astronomy instructors scramble over the landscape in their brightly colored ceramic alloy cybershells. Luna City residents have to endure visiting architects and biologists interested in their unusual city and the companies in Tranquility Industrial zone have to monitor their operations carefully to insure trespassing tourist 'shells aren't deconstructed by their mining nanotech.

Lunar settlers might be tempted to ban cybertourism but for the fact that most rabbits have only seen the surface of their home from the same cybershells rented by groundhog tourists. The moon's major income is through factory work, the kind that is too dangerous or dirty to be allowed on Earth, but a significant part of the planetary economy is dependent on lunar tourism. There is also no lunar government or legal means of banning tourists and their 'shells from the moon in the first place. Of course, most rabbits turn a blind eye to the yearly outbreak of vandalism and sabotage of rental cybershells when the tourist season starts.

There are several companies, mostly located in Luna City that construct, rent and maintain cybershells. These small 'shells are designed to allow tourists to crawl and hop over the lunar landscape, take guided tours of the Tranquility Industrial Zone, or wander through Luna City gawking at the strange buildings and stranger inhabitants. These cheap rentals are lightweight cybershells made of ceramic alloys and aluminum with off the

shelf electronics hooked into the telesphere. Most of them are brightly colored to allow easy spotting and retrieval if abandoned out on the lunar landscape. They're about the size of a basketball and have a basic sensory array across the top of their domed bodies and simple manipulation capacity. Tourist cybershells are rented by the hour, by both rabbits who want to take a look at their own home and by groundhogs. The Lunar Cooperative Credit Union, along with Luna City and Moonshadow manage the satellite network and bandwidth rentals for the 'shell transmissions.

Over the last few years, tourism to the moon has been dropping off, a concern for companies dependent on tourists and a relief to everyone else. As mining and industry has taken its toll on the Lunar landscape, the moon looks more like a leftover strip mine and less like the inspirational pictures taken by the old Apollo crews in the 20th century. Tourists are disappointed by the litter and raw, mined out rock that makes up most of the moon in the modern day and it no longer has the appeal of a frontier. There are also companies that specialize in creating virtual tours of the moon - programs that can be loaded into a telelink that recreate the moon in a pristine state - and these are as realistic, after all, as teletourism of the actual moon and a lot more interesting.

Moonshadow

Moonshadow has never been part of the run of the mill tourist industry. It is a resort town, home to about 5,500 permanent residents - most of whom are employees of SpaTek. Located by the polar ice caps, the settlement caters to the wealthiest of the wealthy with luxury amenities, a carefully planned and maintained community and the best pleasures money can buy.

The settlement is buried under three meters of lunar regolith but careful engineering and extensive augmented reality modifications make it seem as if Moonshadow is a gigantic oasis miraculously blooming on the barren lunar soil. The chameleon walls of the settlement are programmed with seamless imagery of the lunar surface (minus the unappealing ice processors and trash that litter the actual surface above Moonshadow), mimicking the lunar day/night cycle and the beautiful, if artificial, rising and setting of the Earth.

The hallways and caverns of Moonshadow are sculpted and landscaped with genmod plants and animals to resemble a fertile, but exotic, parkland. Most of the animals are albinos and most of the plants and flowers are white, or luminous, or both. Large fireflies modified for the low gravity, blink among

the slender dogwoods and white Rhododendrons bred especially for the resort. Streams chatter near paths of white sand and are alive with glowing fish and iridescent freshwater crayfish. All of the larger animals such as the white deer and the albino birds-of-paradise have been modified for unusually calm temperaments and are tame and friendly.

The center of the resort is Diana's Square, a small town of open-air cafes, small shops, a live action theatre, art galleries and a music hall. There are performances day and night, with the late night performances designed strictly for the adult audience. SpaTek has a small army of employees scattered across the inner system dedicated to searching out the most unusual (but tasteful) emerging artists and performers. Townhouses and luxury apartments are available for those who prefer to vacation in a more urban setting while cabins and supposedly isolated retreats have been built for those who wish to pretend they are living in the 'countryside'.

One of the increasingly rare amenities that Moonshadow provides is personal, living service. The actors in the theaters are real, as are the musicians, the escorts and the friendly staff serving meals and cleaning cabins. Much of the staff has been modified to have a sort of pale, non-offensive

prettiness, but no one employed in the resort can have inhuman looking modifications. The 'human touch' is one of Moonshadow's patented advertising memes.

Not far from Diana's Square is the SpaTek health resort. This complex, carefully engineered to create a soothing and relaxed environment, is the heart of the SpaTek company. Here guests are pampered, comforted, rejuvenated and, if needed, healed. All forms of wellness therapy can be found here, from Chigong to Reishi energy work to the traditional system of physicians, nurses hospitals and Western pharmacopoeia.

Moonshadow is justly famous for the luxurious playground it has created but it is also, arguably, the best hospital and medical facility in the inner system. Rejuvenation therapies are available for the elderly wealthy who vacation here, some spectacular bio and genmods have come from the SpaTek resort and Moonshadow also has an agreement with the LCCU and the LRF to provide trauma facilities when decompression accidents occur. SpaTek pays extraordinary wages to attract researchers and scientists to keep the resort on the cutting edge of medical technology.

Moonshadow has no restrictions on who may visit - except for the incredible expense - famous InVid actors and heads of state may be sitting next to a vacationing tong leader from the Martian Triads or a TSA expatriate who stole enough money to buy residency in the resort. In order to insure the safety of all their clients, no weapons of any kind are permitted in Moonshadow and this is strictly enforced.

Of the permanent residents in Moonshadow, most are employees who work in the Square or

the resort but there are some permanent guests. Permanent residency in Moonshadow is purchased on a year by year lease and twenty years in the resort costs as much as the GNP of Bangladesh. Behind the scenes in Moonshadow a medium sized army of employees keep the resort running, ensuring that each and every guest has the best experience money can buy. Computer programmers and technicians insure the Moonshadow telesphere and v-tag systems are working perfectly, the doctors and therapists are dedicated and skilled while the highly trained security force makes sure no violence or violations of Moonshadow regulations occur. The resort's high cost means that most lunar natives cannot afford to visit which creates a certain amount of friction with the other settlements. To encourage positive relations with their neighbors, Moonshadow guarantees they will hire a certain percentage of permanent lunar residents and they also invest heavily in the LCCU. Some lunar natives believe that the resort is trying to do nothing more than buy loyalty.

Most Dangerous BioShell

There have been murders in Moonshadow. Investigation reveals that they are not quite murders - the victims are all human constructed bio-shells with expensive tele presence hookups in their vat grown brains. Some of the bioshells were destroyed with extreme and disturbing violence. Was there anyone slinked to them when they died? Whose killing bioshells and why? The resort is desperate to find out, before news of these strange 'murders' leaks and their extremely expensive reputation for peace and quiet is destroyed.

Tranquility Industrial Zone and Port Tranquility

Tranquility Industrial Zone, Port Tranquility and Helium City have altered the familiar face of the moon forever. The sprawling manufacturing operations and mining complexes are easily visible from Earth and, even when

the moon is dark, the glitter of lights and reflections from the Industrial Zone can be pinpointed with a pair of hand binoculars.

The Industrial Zone is, in fact, not one single operation but a conglomeration of hundreds of manufacturing and mining operations run by dozens of corporations or nations. Now that space travel is relatively cheap, and the moon can provide most necessary industrial materials except plastics and water, large corporations have found it profitable to move their heavy, dirty manufacturing to the barren - and unregulated - surface of the moon.

Early on the Zone was strictly a mining operation, tons of regolith were processed every hour to sift out the priceless H₃; oxygen, aluminum, iron and the other materials smelted from the regolith during the H₃ mining were treated as marginally useful byproducts.

Tenzen Heavy Industries, Nippon Uchuukaihatsu Kaisha and System Technologies AG are the largest and most established industrial complexes on the moon. While System Technologies continues to focus on H₃ mining, NUK and Tenzen have diversified into producing aluminum, oxygen, iron, titanium and other resources available from the lunar soil. Tenzen has also moved most of their large scale manufacturing to the Zone and hundreds of other industries have joined them.

Most nations on Earth have strict regulations concerning industrial wastes and emissions but the moon has no government at all. Like the 'third world' countries of the 21st century, the moon has become the place where unwanted, filthy but necessary industrial activity is concentrated. Most space vehicles are built on the moon now; all the way from the initial mining of the ore to the final upholstery on the seats. Lunar oxygen and aluminum is sold to satellite manufacturers and colony construction companies while electronics and cybershells are designed and marketed by dozens of companies whose only office is a cybershell in Helium city. Structural supports, modular living quarters the trains for the Lunar cable system and the radio telescopes and arrays for the Farside Observatory are all built in the Zone.

The Tranquility Zone and the Port are run by a loose collection of officials employed by companies working in the Zone. Their main job is to ensure that inter-company friction does not effect overall profitability. Aside from that, there is no law, no government and no overriding organization. Company security forces protect their company's property and each company runs their business in whatever fashion they choose.

Most of the Tranquility Zone is empty of human life, but crawling with industrial cybershells and millions of micro-swarms scouring their company's property for useful materials. Because there are Von Neumann machines in the Zone, a certain level of human presence is required; the last company that attempted to leave Von Neumann machines on Luna without proper oversight had their property destroyed - and devoured - by

an anonymous infestation of military grade microbots. There is also a small, permanent population of technicians, dock loaders, security specialists and administrators who look on their assignment to the Zone as a kind of purgatory.

Helium City

Helium City is where most people living in the Tranquility Industrial Zone are concentrated. It is far from a city; rather a collection of prefabricated housing, offices, warehouses and a few amenities like bars, clubs, whorehouses and hospitals. Helium City is also where many of the enormous sessile manufacturing plants are concentrated, making the place resemble some 19th century Luddite's nightmare.

In the early days, Helium City population was populated with company workers and the occasional transient ship crew waiting for their hauler to be loaded with aluminum or oxygen. Over time, these residents have attracted a population of bar owners, prostitutes, doctors, restaurant owners and other service personnel. As the Port has grown larger, more and more people come through the city and some end up staying, for one reason or another. Almost despite itself, Helium City is becoming a true settlement rather than just a company town.

The Blue Flame

The oldest restaurant in Helium City is the Blue Flame. Theodore and Mario D'Mellio began with an abandoned warehouse and a salvaged food vat. Over the years, the couple's tinkering with their food programs have created an eclectic menu of virtual flavors. The Blue Flame still shows its rough origin in the echoing spaces of the main dining room and the industrial furnishing scavenged from abandoned machinery but most space haulers and shuttle pilots make the Blue Flame their first stop in Helium City. Four of the six D'Mellio children have opened their own restaurants including the Hungry Tiger; the only four star restaurant in Helium City.

Port Tranquility

Port Tranquility is one of the largest spaceports in the solar system, rivaling Cape Canaveral or Sriharikota on Earth. The industrial port can handle almost a hundred heavy haulers and has dozens small ship cradles. Hoppers and medium lift vehicles shuttle between Port Diana and Port Tranquility 28 hours a day and vehicle traffic in the port is constant and heavy.

Like everything else in the Zone, ship docks and the associated communication towers, warehouses and support systems needed to run a busy port are owned and administered by individual companies. New cradles and vehicle landing pads are built by companies as need develops and property 'ownership' around the port is on an unofficial 'first come, first served' basis. One of the major functions of the security forces in Tranquility Zone is the protection of their company's shipyards from electronic subversion by another company. Small companies that are too poor to build their own docks, or protect them from sabotage, rent or lease cradle space from larger companies - or build their docks farther from the manufacturing center - which increases the costs of shipping.

For miles around the Port, Helium City and the older complexes in the Zone there is nothing but played out lunar soil and trash. Mobile mining complexes have scraped up the regolith thought the Tranquility Industrial Zone, leaving raw irregular gashes in the lunar landscape. Areas where the smelters could not reach, such as in deep craters or in unstable terrain has had swarms of microbots comb every inch of the regolith, extracting oxygen, aluminum, iron and the rare H3 or deuterium. All that is left after processing is a fine, featureless dust which surrounds the Tranquility Zone in a constant haze since the low gravity and lack of atmosphere means that these fine particles of lunar regolith remain suspended in space for hours or days.

With no environmental regulations in the Zone, broken machinery, antiquated tools and even personal trash such as non-functional space suits or food garbage has been simply tossed aside and litters the landscape. Most of the trash in the Zone is mechanical in nature and a few start up companies have begun to make a living scavenging these discards with specialized microbots. Preservationists and Pro-government rabbits point to the Tranquility Industrial Zone as an example of everything that is wrong with human habitation on the moon.

Military Operations on the moon

Modern wars are over in minutes or seconds, often without any human input. SAI's and AKV's follow preprogrammed orders and tactics change with the speed of laser signaling and digital thought.

Military operations on the moon are mostly research, training and testing grounds. Every major military power has at least one base on the moon; no one wants the ultimate 'high ground' over Earth to be dominated by one nation or military power. Japan and the ESCA have the strongest military presence but Australia, the United States and China all have large bases on the moon.

Nearside bases all have obvious, well-marked perimeters. Their borders are fenced, lit and v-tagged with warnings against trespassers and the 'shells' and AKV's that patrol the perimeter are armed with non-lethal programming and weaponry. Trespassing tourist 'shells', protesting preservationists and rebellious teenagers from Luna City are collected and escorted off the military grounds with minimal fuss and effort.

The ESCA's Tranquility Testing Grounds is the largest military base on the moon. Located on the far rim of the Tranquility Crater, the ESCA's base is used mostly for tele-trooper training, cybershell tests and a base for inner system patrol vehicles. As the industrial zone has grown across Tranquility Crater, conflicts between the military and the civilian uses have become increasingly common. The 'invasion' of 2092 cost the EU billions when poorly programmed AKV's attacked and destroyed a Tenzen mobile factory. The attack and destruction of the mining crawler happened so quickly that the military technicians monitoring their machines were unable to stop the destruction.

Luckily, the Tenzen equipment was also completely automated and they lost nothing more than a few billion dollars of deuterium and H3 - which the EU had to pay for. The 'invasion' however, was a sobering reminder of just how deadly and fast modern warfare had become.

There are over 2,000 military personnel in the Tranquility Testing Grounds, tele-troopers, technicians, officers and pilots from the Royal Navy take their leave in Luna City, Helium City or (if they can afford it) Moonshadow. The Tranquility Testing Grounds are part of the LCCU's cable network. For Helium City, the base is a growing source of income. The EU does not allow military dependents to live on the Testing Grounds, so Helium City has a growing population of military spouses and children - with the attendant schools, nurseries, medical centers and so on that accompany all military bases.

China, the PRA, the United States and the ESCA all have military grade ultraviolet lasers and particle accelerators stationed on the moon as deterrence against orbital warfare over Earth. These bases are relatively small and highly secure; any trespassers or unauthorized entry is dealt with

harshly. These bases have to be clustered in a few locations where targeting windows give maximum coverage over attack vectors from Earth. The staff from these bases, sometimes from nations hostile to each other, have been known to socialize with their neighbors who may be no more than a dozen miles away.

The Australian military base, Fargone Station, is much smaller and designed for training tele-troopers in low gravity and no atmosphere combat.

Australian and PRA soldiers are much more transient than the staff at the EU base, most of the tele-troopers spend just enough time on the moon to learn low gee tactics and how to invade a sealed settlement without killing everyone inside. Part of Australian basic training, the uncomfortable and spare Fargone Station is the punishment command for those Australian officers permanently stationed there.

For live action troopers, low gee combat training takes longer than troopers operating military remotes do. Encumbrance of armor, weaponry and a troopers own body mass goes way down but the unfamiliar effects of inertia require adjustments on any DX based skills. For most DX based skills, a -1 penalty is applied for every G increment; on the moon, untrained personnel are at -4. Any weapons with recoil become much harder to use, increase the ST

requirement by 1 for every Gee increment. [.2 G is an increment] Move increases significantly on the moon, +1 per negative Encumbrance, as well as jumping and climbing.

Travelers new to the moon have the most difficulty understanding the difference between inertia and mass. Objects have less weight on the moon, but their inertia remains the same - a two-ton boulder may be moving slowly but its inertia is still deadly. The average training program for live troopers is four weeks at which time the trooper will have a default +1 in Low-Gee combat.

Cyber-troopers have a much easier time. Their military 'shells are reprogrammed for the gravity of the combat zone and the rest of the training has to do with handling vectors of long range weaponry, the tactical advantages of low gravity and the unexpected effects of inertia.

While Fargone Station is a small, relatively isolated military base, it is the one facing the most protest by lunar natives. In an environment as deadly as the moon, the rabbits don't want a group of soldiers being trained to sabotage and invade the very settlements everyone depends on.

Settlement sabotage and invasion in vacuum is a very delicate or very deadly tactic. It's easy to open a settlement to space, killing everyone inside in a few moments. The hard part is keeping anyone inside a target settlement alive. Most attacks on sealed settlements are left up to military swarms and microbots; they aren't going to have to blow an airlock or split a dome to get inside.

The moon is the major testing ground for military microbots and swarms. The barren environment minimizes random variables in the early testing stages and there's plenty of room to play in. Military sensor swarms and microbots are also the major way the various nations fight their battles on the moon. Generations of swarms and microbots have grown up in the lunar battlefield, refitted, reprogrammed and reformatted in a microscopic arms race. These tiny battlefields are more dangerous on the farside, where lethal force is acceptable and expected.

The current development for military microgear are passive nanoswarms. These -still in development -microscopic devices, not larger than bacterium, piggy back their way into enemy systems on air filters, spacesuits or can be dropped by spies or saboteurs. This way they bypass the electronic safeguards against enemy signals from the outside. Like any virus, they remain dormant until their passive sensors pick up the particular signature they were programmed to respond to. Most of these swarms are informational only, they infect an electronic system for a brief time and send out an encrypted squeal, using the communications systems of the equipment they have infected. There have been a few attempts at developing sabotage swarms of this type and if they are successful, no one is talking about it.

There is a second, almost completely separate military program on the farside of the moon. With the radio and visual restrictions on settlements on the farside, the bases there are hidden in darkness and silence. These military bases are listening posts, critical data storage sites or 'top secret' research facilities. They do not provide generous warning for trespassers and prospectors and scholars exploring the Farside have disappeared in areas suspected to hide military bases.

The largest, and least secret, military base on the Farside is Chinese operated. Base-10 is a deep space monitoring station and its array of radio telescopes and listening systems could not be hidden and still be effective. Base-10 is visible from space but is partially protected by the no-orbit zone above the Farside Observatory. Everyone knows its there, but remains politely silent about it. Its publicity makes it less effective than it might otherwise be and most military planners assume there is a second, better hidden base somewhere on the farside.

Base-10 monitors military actions in the inner and outer systems and has provided early warning for their government in relation to Duncanite activities, major movements by the Martian Triads and independence movement on Mars. The US deep space fleet plays hide and seek with Base-10 on a regular basis. Base-10 occasionally provides communication assistance to distressed space vehicles by guiding and coordinating rescue efforts. The French Foreign Legion still has two of their inner system patrol vehicles - and their crews - due to the efforts of Base-10 after a failed raid on a

Triad stronghold and they have not forgotten this.

The military population on the moon will continue to grow, as the inner and outer systems become more accessible. With the discovery of H3 in the gas giants, the outer system has become strategically critical. The importance of H3 deposits in the gas giant has created a fixed, valuable point in deep space and tacticians are already creating scenarios where one nation or another attempts to hold Saturn or Jupiter as their property with force of arms.

Lunar Cooperative Credit Union

There is no pan-Lunar government; most settlements are property of various corporations, such as SpaTek or possessions of governments, like the numerous military bases hidden beneath the surface of the moon. There might be some settlements that wish a Lunar wide government, but Earth's interests are too strong and the moon is simply too close to the Earth to allow for a successful independence movement.

There are times, however, when the various settlements need to act in some kind of coordinated fashion and that is where the Lunar Cooperative Credit Union comes in. The LCCU began in 2062 as a financial institution open to any permanent settlement on the moon and that remains its major function. The LCCU provides loans, currency exchange services, bank accounts, insurance and investment services to its members. Over the years, it has also evolved into the lunar bargaining and lobbying organization serving the interests of the rabbits over the interests of the groundhogs.

LCCU's earliest major efforts was the purchasing of the Selenite biomod from BioEuphrates at a significant price break and, in turn, subsidizing its sale to lunar residents. When the idea for the rail and communication line

network was initially brought up in the yearly member meetings, the LCCU was the administrative and financial backing that made it possible. The LCCU still provides the administrative and technical support for the network; it also is the administrative arm for the LRF.

Perhaps the most critical aspect of the LCCU is its management of lunar claims. There are hundreds, if not thousands, of prospectors and miners out on the moon looking for water, H3 or other valuable volatiles. There are also communities petitioning for permanent settlement rights. Prior to the LCCU, there were constant skirmishes among prospectors and settlers, each trying to 'rustle' the other's property. There was no method of registering that a company or individual had rights to any particular place on the moon. The LCCU became the de facto claim manager, they have extensive working maps

of the lunar surface and they keep records of who is working what area. They cannot sell property, no one owns the moon, rather they license resource extraction rights and settlement privileges. The LCCU reminds prospective settlers and companies that this system allows the LRF to quickly locate a lost prospector or decompressing settlement. Any settlement that wishes to hook up to the cable network must also lease their land from the LCCU. The LCCU maps and registry of claims is completely confidential, to protect their members privacy. Only the LRF has access to the mapping system, to allow them to do their jobs. There have been several, so far unsuccessful, attempt to copy or steal the mapping service since it records where various resources may be concentrated and some 'secret' bases have also allowed their location to be mapped in exchange for the safety of the LRF. The vast majority of the military bases are not permitted by their governments to participate in this system, leaving them - sometimes literally - out in the cold when accidents happen.

Prospectors and settlements pay for their leases through a percentage of their profits. The LCCU encourages prospectors to pay for their leases in barter - like water or H3 mined from the claim - rather than money. Over the years, the LCCU has slowly acquired a large water 'bank' and they sell this water to their members at a discounted price.

Both individuals and settlements may become LCCU members. Membership covers all of the financial services the company provides as well as discounts on several bio or genmods. The LCCU also acts as a mediation service for settlements with conflicts - one of its least popular jobs - and they also lobby various Earth companies or governments to encourage economic and political policies favorable to the moon.

Living on Luna

Luna is the site of humanity's first permanent off-world colony. Here, early space travelers discovered how to survive and prosper in the vacuum of space. Learning to survive on the moon was a complex and difficult process - while most factors were easily dealt with, there were a few problems that required great ingenuity to overcome. Oxygen, building materials and radiation shielding can all be easily obtained on the moon. Lunar soil can be smelted in solar-powered furnaces to obtain large quantities of iron, aluminum and oxygen. Similarly, several meters of loose lunar soil shoveled over a habitat safely protects the inhabitants from both radiation and micrometeorites. However, Luna is one of the driest places in the solar system, and with the exception of a few polar ice deposits, water is extremely difficult to obtain. Similarly, solar cells seem like an ideal solution to lunar power - the lack of atmosphere causes them to generate over 20% more energy than they do on Earth.

Unfortunately, the long lunar night means that unless a habitat is located at the poles, it will be cut off from the sun by the 14-day lunar night.

The original colonies imported all of their water, used careful recycling to conserve it and were powered by compact radio-thermal generators. As humanity later expanded over the moon, other options became available. Today, almost all hydrogen and water are locally mined from polar ice deposits, or produced as a byproduct of the Helium 3 mining. Also, power is now provided by a combination of solar panels and fusion reactors using locally mined Helium 3. To avoid emergency power loss and to enable settlements dependent on solar power to operate during the long lunar night, super-conducting cables buried under a meter of lunar regolith connect most settlements.

These cables serve two purposes. They allow settlements currently in the bright lunar day to give power to settlements now in the dark, in exchange for a similar sharing of power when their positions are reversed. Also, these cables provide power to the network of raised mag-lev trains that connects all major lunar settlements, including Luna City, Tsiolkovsky Farside Observatory, the Tranquility Industrial Zone, and the Moonshadow resort. Today, approximately 80% of all lunar settlements are a part of this network. With speeds up to 400 mph, this transit network allows residents to travel anywhere on the moon in less than 8 hours. Since many of these journeys take between four and eight hours, the travel pods are all moderately spacious, comfortable vehicles. These cars provide on-line access using cables buried in the track, as well as emergency radio and laser communications. All travel pods contain a small snack and beverage bar, and large reconfigurable seats that can convert to small but comfortable sleeping surfaces for longer trips. For safety reasons, all of these vehicles also carry sufficient air, food and water to safely support travelers for up to five days. Unlike earthly trains, each 20 meter long, 4-meter wide travel pod is effectively a separate, self-propelled train with its own air lock. Individual cars arrive at each settlement on the mag-lev network every two hours. Because of the low cost of the electricity necessary to operate this network, travel between settlements costs between \$5 and \$40 a trip, depending upon the length of the journey.

In contrast, emergency personnel, and anyone who is in a similar hurry travels by means of one of the many rocket-powered lunar hoppers. Hoppers and the far slower moon buggies are also the only way to visit any of the small independent communities that are not part of the power and mag-lev network. Propelled by locally made metal oxygen rockets, hoppers normally fly in suborbital trajectories that allow them to reach any point on Luna in less than 90 minutes. However, most can also reach orbit and are sometimes used to visit Port Diana, the space station orbiting the moon. Journeys on lunar hoppers must be individually chartered and typically cost several hundred dollars per trip.

Bullseye Club

The Bullseye Club was started by, Martha McMins, the first person to be hit by a meteor and survive. A wealthy socialite, she created the Bullseye Club and left her inheritance in a trust fund to support it. Administered by the LCCU, the Bullseye Club is open to anyone who survives a meteor strike. In the forty years the Club has been active, there are only three members. Membership in the Club includes lifetime free medical care, a one-week stay per year in Moonshadow and a yearly allowance of 50,000 US dollars. Martha traveled after her miraculous survival, giving inspirational speeches, and most spaceports have a small, luxurious apartment reserved for Club members. Per her will, as new spaceports are built, the LCCU acquires living quarters for potential Club members. Members of the Bullseye Club must wear the target and comet logo of the Club in order to access its benefits.

Isolated Communities

While the vast majority of lunar settlements are connected to the power and transport grid, some are not. These habitats are typically owned by eccentrics of various sorts, or by corporations or governments that are performing some form of secret research. Regardless, the majority of communities who value privacy over convenience do not welcome uninvited visitors. Some secret bases even go so far as to conceal their exact location by using entrance tunnels several miles long and external air locks hidden under the rims of large craters. Most of these colonies also use cybershell-controlled machinery to excavate and process lunar regolith to provide both deuterium and Helium 3 for power, allowing them to be fully energy independent, as well as eliminating the need for vulnerable and highly visible solar cells.

Given the small size and low power demands of most of these habitats, lunar soil processed during the settlement's initial construction normally provides sufficient fusion fuel to power the entire community for several centuries. Even the advanced observation satellites that surround Luna cannot pinpoint the exact location of the most secretive or paranoid of these communities closer than within a square mile or two. The only way to exactly locate such colonies is to comb the area they are likely in using one or more hives of sensor or explorer microbots. However, such cyberswarms give off radio signals that can easily be detected by sensitive listening gear. When a nearby cyberswarm is detected, high security facilities typically send out various defensive cyberswarms to destroy the invading microbots before they can obtain useful information. Most of the high security habitats will broadcast a brief message before they release their own cyberswarms, warning any sapient beings to immediately depart so they will not be harmed by these defensive microbots. However, several of the most secure corporate and military bases rarely bother with such warnings.

Safety and the Lunar Rescue Force

While a number of earth-created InVids suggest otherwise, the risk of decompression due to meteorite impact is little higher in a lunar base buried under several meter of hard lunar regolith than it is on Earth. Instead, the primary risks on Luna come from mechanical failures, accidents and sabotage. Despite that fact that everyone realizes that their lives depend upon how well all of their equipment is maintained, accidents still occur. The largest lunar accident was in 2085, when a crack in a Luna City observation dome caused a large-scale decompression that killed over 4,000 people.

In addition, every year nearly 100 people die in various forms of blowouts or explosive decompression accidents. The majority of these accidents involve one or two individuals dying when their spacesuit or their vehicle malfunctions. However, almost every year there is at least one moderately serious accident in some settlement that kills or traps up to several dozen people. Since humans die in minutes when exposed to vacuum, and survivors are sometimes trapped in enclosed areas without external air supplies, Lunar residents have developed protocols and procedures to maximize survival. These procedures have become highly standardized throughout Luna.

To become a member of the Lunar Cooperative Credit Union, member settlements must agree to a variety of safety standards. These include requiring airtight doors on all residences, placing emergency space suits and rescue balls in all large public places and small emergency life support systems in all residences and shops. As long as the room does not leak, this equipment will allow the inhabitants of a typical apartment can survive for up to 40 hours if cut off from all external life support.

While communities that are not members of the LCCU do not have to abide by these safety rules, almost all do anyway. Most rabbits will refuse to even spend the night in any habitat that obviously does not follow these regulations. In part, this is because native-born rabbits

are considerably more safety conscious than most people born on Earth - several generations have grown up with decompression drills and the constant awareness that sudden death waits just outside their walls.

Almost all lunar children learn to use a spacesuit by the time they are 7 years old and one of the major rites of passage is when young teens receive their solo vacuum certification and are then allowed to venture outside without adult supervision. In most communities teens are first eligible to pass this exam when they are between 13 and 15. Many Lunar teens then express their independence by taking extended day trips on the surface.

All rabbits are expected to own their own spacesuits and to maintain them in optimum condition. People who neglect their suits are considered to be both slovenly and irresponsible. While some communities regard this practice as frivolous, most rabbits paint and decorate their suits. In addition to being a statement of personal aesthetics; this practice also helps people recognize individuals from a great distance. All of these designs are expected to be highly visible. Geometric patterns, reproductions of artwork, images from other worlds, family portraits, or even scenes from popular InVids are all popular suit motifs. When all precautions fail and dangerous accidents occur, the Lunar Rescue Force (LRF) is called out to help. The LRF is a semi-private company largely supported by donations from the LCCU. Although they are all part of one unified company, the 900+ members of the LRF are stationed all over the moon, with at least one standard company of twenty in every lunar settlement that is both a member of the LCCU, and contains more than 1,000 people. Using their fleet of over 50 hoppers and 5 orbital transfer vehicles (OTVs) the members of the LRF can be anywhere on Luna in under half an hour. Once there, the members of the LRF team deploy hives of explorer microbots to locate survivors, preparing portable airlocks and attempt to establish communications with everyone in the area. LRF members are all licensed paramedics and all teams contain physicians, cybershells designed for heavy lifting and construction work as well as numerous personnel trained in rescue work, spelunking and crowd management. Since the LRF has occasionally been called upon to deal with various terrorist incidents, all teams also contain members and SAIs capable of defusing bombs and performing similar anti-terrorism measures.

Daily Life

As a reaction to the bleak desolation of the lunar surface, most lunar settlements are full of life. While Luna City is clearly the most extreme, with the residents effectively living inside a single vast organism, most other communities, including both the Tsiolkovsky Farside Observatory and the Moonshadow resort have abundant planters filled with flowers, ferns, and even small trees. In many settlements, specially engineered fast-growing grass is used as flooring in both public areas and private residences. Newcomers are often surprised at the presence of flowers and even fruit trees inside personal residences and at the general profusion of plants. Lunar trees are particularly spectacular since the low gravity gives them

a tall, slender almost ethereal appearance.

In many communities, there are also numerous small animals in the public green spaces. Songbirds, squirrels, and brightly colored lizards have all been genetically engineered to adapt to low gravity and to have carefully sanitized metabolisms that produce inoffensive waste products. Such creatures are found in most lunar settlements and more than 70% of lunar households own pets. EU law prevents the ownership of fully sapient pets, but bright, responsive, mildly uplifted pets are quite popular, especially small ones like cats, geckos, parrots and even the occasional astropus. While these animals serve a purely aesthetic purpose, the plants are also extremely practical. In most lunar settlements, the public and private greenery serves to purify up to 20% of the air in the colony and does so in a manner the residents find pleasant and refreshing. However, the majority of air in most Lunar colonies is purified in the specially dedicated hydroponic units.

Unlike traditional hydroponics, almost all lunar plants are grown in finely ground lunar soil that serves as a growth matrix, through which are pumped water and nutrients. The results are generally superior to most other form of soil-less agriculture and permit an extremely wide range of crops to be grown. When combined with the typical range of chickens, carp, and in larger colonies goats and small pigs, the average lunar community eats fairly well. However, in many of the smaller communities trade with Luna City provides a welcome relief from a somewhat monotonous diet. While the locally grown wall-fruit free is to all Luna City residents, the loss of biomass means that it cannot be freely removed from Luna City, and instead must be paid for. In the poorest settlements, Luna City wall-fruit is considered to be a special treat.

One feature of all lunar communities is an intensive awareness of water and hydrogen conservation. Although lunar water recycling technology is highly efficient, there are still small losses. While water is only rationed in the poorest and smallest communities, everyone growing up on the moon is taught to conserve water and individuals who waste water are considered to be selfish and dangerously careless. In most lunar settlements, personal water usage is also taxed on a graduated scale with high water users paying proportionally more. Luna City and several other small polar colonies are generally exceptions to these rules since they are built on or next to large ice deposits. However, even residents of these settlements make certain not to needlessly waste valuable water. In contrast, because it can be extracted so easily from lunar soil, oxygen is not considered a scare resource, and in most relatively large and prosperous communities, residents are free to smoke and to burn candles. Often people who smoke or otherwise uses fire extensively are charged a small oxygen tax, but the additional expense is minimal and there is not social stigma attached to above average oxygen usage.

Lunar Orbit

Unlike Earth, there has never been a pressing reason to place a large number of inhabited

stations in lunar orbit. Instead, there are a large number of small satellites used for selenological surveys and locator beacons for the Lunar Positioning Satellite (LPS) network, as well as various radio and microwave communication satellites, corporate and military spy satellites and mapping and surveillance satellite used by the Lunar Rescue Service. Everyone on the lunar dayside can instantly communicate with anyone else using these satellite relays and can rapidly obtain detailed information about their exact location. However, the restriction on farside emissions mean that satellites passing over the farside are limited to communicating with short bursts of low-power laser communicators. Establishing a link to a LPS or communication satellite while on the farside requires as clearly view of the sky, some form of magnification to locate the satellite, a laser communicator and a roll against Electronics Operation (Communications) at -4. Maintaining this link requires an additional Electronics Operation (Communications) roll at -2 once every 15 minutes. While all satellites passing over the farside are capable of sending and receiving radio signals, communicating with them in this fashion results in a \$2,500/minute fine. The only exception to this rule is during an actual emergency. In such cases, the LRF notifies the observatory and all satellites over the farside begin normal radio broadcasts.

The only inhabited station in Lunar orbit is Port Diana, a small station that is used by low-acceleration vessels from the Lagrange colonies, Mars and the outer solar system that lack the capability to land safely on the moon. To avoid station communications disrupting activities at Tsiolkovsky observatory, Port Diana is located in a low polar orbit and uses a low power fusion drive to keep it aligned with the boundary between lunar day and night. Port Diana never passes over the farside and is not visible from Tsiolkovsky observatory. As a result, no emissions from Port Diana ever reach Tsiolkovsky Farside Observatory. Port Diana has a permanent staff of only 24 people, but can handle the arrival of up to 5 of the largest deep space vessels and house up to 200 residents. For both the comfort of 0-g adapted visitors, and to improve docking safety, the Port Diana is a non-rotating 0-g station. As a result, a number of lunar residents come to Port Diana for 0-g vacations. Currently there is a fad for 0-g honeymoons among wealthy lunar newlyweds.

Port Diana's small fleet of OTVs and lunar hoppers can rapidly ferry cargo and passengers to and from the surface. The station itself serves as a well-appointed port of entry where EU customs officials and LCCU safety inspectors can check all passengers and cargos for radioactives, dangerous technologies, diseases or stolen merchandise. Since there is no requirement that ships actually dock at Port Diana, Lunar customs is primary designed to catch particularly inept or desperate criminals or dangerously unbalanced terrorists. Skilled smugglers and other experienced criminals almost always rendezvous with their clients at relatively open colonies like Remillard Studios.

Mining and Industrial Activity

The extraction of iron, oxygen, aluminum and titanium are quite simple. These elements

make of the majority of lunar regolith, and can be separated by simply heating lunar rock in a solar furnace and reacting the rock with hydrogen or carbon dioxide, both of which can be almost completely recovered at the end of the process. Using inexpensive solar mirrors and mining cybershells, many of the larger lunar communities produce their own supplies of these abundant elements. Also, both System Technologies and Tenzan Heavy Industries sell large quantities of oxygen and metals to the Lagrange colonies and to lunar settlements too small to afford their own resource extraction facilities. Mining of this sort have been going on for more than 65 years and is now a mildly profitable sideline to the far more recent and lucrative Helium 3 mining.

Helium 3 mining is both far more expensive and difficult. However, the product is also far more valuable. Every pound of Helium 3 is worth slightly over a million dollars. However, more than 90% of this money is consumed by the expense of extracting it from the lunar regolith. Helium 3, ordinary helium 4, hydrogen, carbon and nitrogen are all trapped within minute grains of ilmenite, a glassy agglutinate of iron, titanium and oxygen that holds these gases within minute spaces inside its crystal structure.

The standard method of Helium 3 mining involves large vehicles scraping up vast amounts of lunar soil and simply heat it with great solar mirrors, while trapping all escaping gases and separating out the tiny amounts of Helium 3 present. Most mining operations use cybershell-controlled regolith mining equipment to scoop up great quantities of regolith and bring it back to a centrally located solar furnace. However, a number of the medium-sized mining operations are based in enormous mobile vehicles, which have permanent populations of up to a dozen humans or parahumans and almost 100 SAIs. These huge mining crawlers move slowly across the lunar surface, leaving vast furrows and piles of melted slag behind them. The glint of the large solar mirrors mounted on these crawlers is easily visible to anyone on Earth or the Lagrange colonies using a moderate power telescope.

Unfortunately, all lunar mining operations are becoming less profitable as increasing amounts of Helium 3 are mined from Saturn's atmosphere. As profits continue to drop, the lunar miners are attempting to find better and less expensive methods of mining Helium 3. The most successful new strategy involves the use of large swarms of microbots to collect individual ilmenite grains. An average sample of lunar regolith contains about 10% ilmenite, and even the richest regolith contains no more than 20% ilmenite. Since separating out the ilmenite grains from the rest of the rock using conventional means is a lengthy and difficult process, previous mining methods involved collecting and heating unprocessed regolith to obtain the maximum yield of Helium 3.

In the new swarm-mining, specially designed microbot swarms burrow through the regolith, collecting the ilmenite grains and leaving powdered rubble behind them. Swarms of these microbots look much like hordes of tiny worker ants carrying food or other useful commodities back to their homes. Well-designed microbots can retrieve more than 70% of the ilmenite grains from a sample of regolith, greatly reducing the energy costs of processing, and increasing profits by almost 50%.

Swarm mining was first employed in 2094 and has been gaining in popularity ever since.

However, there are several potential problems associated with swarm mining. There have been several incidents of swarm-rustling, where rival mining concerns use stolen passwords and similar means to redirect a mining swarm so that it brings its valuable supply of ilmenite back to someone other than the swarm's owner. Also, these mining swarms are effectively devourer swarms with some additional capabilities and programming added. While the most expensive models are programmed to not attack humans or human-mode devices, several of the less expensive models will only avoid targets that broadcast special signals and will destroy anything else within their assigned region in their relentless search for ilmenite. As an additional safety precaution, most mining companies offer well-marked safe-zones where anyone caught within the mining zone can retreat to and call for help. There are rumors that several mining concerns specifically purchase the less safe varieties of mining swarms to help deter helium thieves. While swarm mining is still less profitable than mining Helium 3 from Saturn's atmosphere, it has allowed a number of lunar mining concerns to remain viable. One useful result of all forms of Helium 3 mining is that for every pound of Helium 3 produced, over a ton each of hydrogen, nitrogen, and carbon are also liberated. Since the cost of the endeavor is paid for by the sale of Helium 3, these useful elements are essentially produced for free and are used to help support and expand the mining operation's life support, as well as being sold or traded to other lunar settlements.

Individual Settlements

Tsiolkovsky Farside Observatory

Originally created in 2022 as an uninhabited observatory built by a joint EU-Japanese effort, by 2033, the Tsiolkovsky observatory had a population of 50 astronomers and technicians and was the moon's first permanent settlement. Today, the observatory has expanded far beyond its original boundaries and is now the most advanced observatory in the solar system. It now has a population of over 300 permanent residents, and every year more than 500 graduate and post-doctoral students come to study with these researchers and professors. Also, many times that number of scientists and students from all over the solar system sign up for time on Tsiolkovsky's various powerful astronomical instruments. This research station has both the most powerful radio telescope and the largest infrared telescope in the solar system, as well as optical and x-ray telescopes second only to those at the prestigious Kepler Observatory. While the population of Tsiolkovsky is only a small fraction of that of the Kepler orbital station, Kepler is a fully accredited university, while Tsiolkovsky is primarily a research facility with a small graduate department. Also, while Kepler Observatory has opened its doors to students from throughout the solar system, Tsiolkovsky still primarily looks for its students and faculty on Earth and Luna.

Tsiolkovsky's total isolation from all earth-based electromagnetic interference allows its

highly sensitive instruments to detect astronomical phenomena too faint to be otherwise perceived. To maintain this electromagnetic isolation, international agreement has placed the entire farside of the moon off-limits to all settlement. In practice this means that the only other settlements there are deeply buried, highly secret and secure corporate and military research bases that must be located at least 500 miles from Tsiolkovsky. To avoid breaking international law, these bases must have no detectable electromagnetic emissions. A number of lunar communities and Helium 3 miners are resentful of Tsiolkovsky's privileged status. However, the fact that researchers there have discovered over half a dozen life-bearing extra-solar worlds, combined with the additional security the non-emissions policy provides to the secret research bases located on the lunar farside, means that international lunar farside policies are unlikely to change anytime soon.

Current Projects

The search for additional life-bearing worlds continues. Also, the observatory recently restarted its Search For Extraterrestrial Intelligence (SETI). In addition, a number of astrophysicists at Tsiolkovsky have begun making a detailed examination of several rapidly spinning supermassive black holes. This study is partially being performed in hopes of actually detecting evidence of theorized fast-than-light phenomena.

The continuing Long Term Gravitation Study (LTGS) being conducted in conjunction with the Kepler Observatory is currently one of the best funded and most talked about projects. In 2098, work was complete on the portion of the long baseline gravity wave detector in Kepler Observatory, Tsiolkovsky's detector was completed in 2097. Presently the two observatories are creating the first detailed gravitational map of the galaxy. This project has already discovered thousands of previously unknown brown dwarf stars as well as several large gravitational anomalies near the center of the galaxy that a few scientists claim could be evidence of extra-terrestrial stellar-scale engineering projects.

LRF Operations at Tsiolkovsky

One curious feature of the observatory's isolation is the fact that it houses the only LRF team based on the Lunar Farside. Three times in the past decade, serious accidents in secret corporate or governmental research bases have prompted the survivors to call for help from the LRF team stationed at Tsiolkovsky. In the aftermath of each such incident, intelligence operatives made a number of discrete and highly lucrative offers to members of this LRF team in an attempt learn more about the various research projects.

Although little has been learned, two years ago LRF team member Jacques Nakamura was paid quite handsomely by the US government in return for allowing them to implant a carefully shielded slinkie recorder in his brain. To keep any data he records secret, it is recorded on the computer linked to his Virtual Interface Implant and not broadcast. In return for the money, Nakamura will be expected to turn over all recordings of future rescue missions to US intelligence agents. Only Nakamura and a few highly placed members of the US intelligence community know about this arrangement. While these intelligence operatives do not expect Nakamura to be able to gather much data, the chance that some year he will see or hear some crucial piece of information is worth their investment. Since this deal violates the charter of the LRF as well as both EU and Japanese law, Nakamura has kept the entire arrangement a closely guarded secret and his slinkie recorder has been disguised so that it appears to be a simple slink player on all normal medical scans.

Remillard Studios

While Luna is the home to many thriving and prosperous communities, not all settlements are equally successful. Remillard studios is widely acknowledged to be one of the moon's failures. Jeanette Remillard is a multi-millionaire whose parents made their fortune creating genetically engineered crops. In an effort to foster practicality and self-reliance in her, when she was 25 her parents gave Jeanette 25% of their business. She immediately turned this over to managers and SAIs and set out to fulfill her dream of running a successful movie studio that produced high budget, elaborately beautiful action InVids. Being a media purist, Remillard was determined to minimize computer effects to give her InVids a somewhat archaic and highly "realistic" feel. She decided that setting the studio in the low Lunar gravity would be the perfect way to enable her to safely stage death-defying action sequences with a minimum of computer retouching. Also, she had visions of using the bleak lunar landscape as the setting for all manner of fantastic space operas.

Liquidating the vast majority of her assets, she financed the construction of a large underground lunar habitat. Remillard Studios has several miles of long straight corridors for chase sequences, as well as large parks, reconfigurable public areas and elaborately decorated private dwellings to serve as both the residences of the cast and technicians and attractive and easily accessible locations for filming.

Remillard Studios was designed to be a largely self-sufficient community with 3,000 permanent residents. Jeanette Remillard conceived of it as both a place where she could make her own InVids, and where other small independent InVid makers could come to pursue their own dreams. Both to support this expansion and to provide sufficient space for large-scale

epics, the studio is as large as many settlements designed to hold a population of more than 6,000.

The mixture of set and settlement gives Remillard Studios an almost surreal feel, but Jeanette Remillard had both sufficient funds and enough investors that it attracted a good deal of attention when it first started InVid production in 2091. Its first InVid, the pulp epic "Sky Pirates of Barsoom" developed a large cult following but was considered too retro by most viewers. Remillard then produced a series of sequels and related pieces that delighted the core of her audience while alienating most casual viewers. Eventually, her investors grew upset at the steadily declining profits and suggested that she attempt to attract a wider audience. The resulting production, "Star-crossed Agents" was a romantic spy epic that is widely considered the worst high budget InVid of 2096. After this financial disaster, almost all of her investors pulled out and left Remillard with a failing studio and few personal assets. At this point, her parents offered her a job at their business if she would sell the studio and accept mimetic therapy to become more practical. She refused and decided to attempt to keep Remillard Studios running.

Since the Studio is mostly self-sufficient in terms of the basic necessities, it can continue to create low to medium budget InVids for a small but moderately devoted audience. However, the funds generated by these InVids are insufficient to allow adequate maintenance of some of the settlements for expensive features like the reconfigurable public areas. Also, the increasing popularity of slinkies has further diminished her audience.

Today, Remillard Studios has a population of around 2,000 and evidence of the poor state of its finances is readily apparent. While life support and other essential systems are all carefully maintained, a number of the local amenities are becoming increasingly problematic, especially since most of the profits from the InVids are needed to purchase props and programming upgrades for future InVids. Currently technicians who donate their services in return for a chance to appear in these InVids perform much of the work at Remillard studios. In the rest of the solar system, its InVids are now largely unknown outside the ranks of its few devoted followers, but on Luna Remillard Studios is known as a place that attracts foolish young people dreaming of a career in entertainment. While the most promising students normally seek acting or media degrees and move to Earth, every year a few dreamers audition at Remillard Studios. Prospective actors and technicians who also possess skills and training that will help keep the community operating are given priority, sometimes at the expense of the ones with the most talent.

Remillard Studios has a fairly dubious reputation among many of the more strictly law-abiding lunar residents. With limited income and little choice in who they hire, it has become a major center for fencing low to moderate value stolen goods and various other forms of petty vice including unlicensed prostitution and the sale of illegal intoxicants and illegally copied media. Two years ago, failing profits also forced Jeanette Remillard to lease sections of the setting that are not currently being used to reality gamers from Luna City. In addition to providing a perfect site for the more action-oriented portions of these games, a number of individuals now rent space under the pretense of running reality games. However, they are actually using Remillard Studios as a place to make various illegal transactions like buying or

selling smuggled goods or data.

While Jeanette Remillard is aware that some people are using Remillard Studios for illegal purposes, she is more concerned with keeping her failing studio from total financial collapse, and politely ignores all but the most obvious and highly illegal transactions. Also, being far from stupid, she has recently borrowed money from one of her few remaining wealthy friends so she could purchase some intelligence-grade surveillance microbots. She is using these microbots to record many of the various illegal transactions going on in her studio. She is already planning on loosening her standards about digitally manipulated images and using recordings she made of the infamous Lynx Crew in her next InVid, after she alters all of the faces and voices so that they are all unidentifiable. Remillard hopes that such touches of verisimilitude will help boost sales. The friend who loaned her money is also encouraging her into using similar recordings to actually blackmail some of the criminals who buy and sell illegal and stolen goods here.

To many rabbits, Remillard Studios is now considered a somewhat dismal den of vice that no self-respecting actor or media technician would work for. However, young people, typically with more enthusiasm than talent still come here every year.

Selenite Luna-Safety Biomod 15 points

This is the most common biomod on Luna, used by 75% of the residents who do not possess the Lunar Standard Upgrade or some similar genemod. This biomod was developed by Biotech Euphrates in response to the Luna City disaster of 2085. Since more than 80% of the fatalities were un-modified humans, and many were found halfway into their spacesuits, the LCCU recommended that Biotech Euphrates develop an inexpensive and safe biomod that could give every Luna resident the same safety advantages possessed by the Lunar Standard Upgrade. In an effort to prevent a repeat of the Luna City disaster, The LCCU now uses a portion of its resources to offer this Biomod at a 50% discount to everyone who wishes to take up long-term residence on the moon. Similar biomods are also available from several other major genecorps, and are also becoming increasingly common on many asteroid stations and space colonies.

This Biomod consists of several modifications that allow the recipient to be far safer and healthier on Luna. Most corporations subsidize the entire cost of this biomod for their employees as a way to avoid having to pay costly medical bills later. This biomod produces no obvious changes in the subject's appearance, but it does have a number of important effects. Complex nano-viruses are specially tailored for the subject - these viruses alter the structure of the subject's lung tissue, allowing him to extract more oxygen from the air. In addition, significant modifications to the subject's bone marrow and spleen significantly enhance the ability of the subject's blood to hold oxygen. Not only can recipient's hold their breath for four times as long, they can also remain conscious in vacuum for four times as long due to the higher levels of oxygen in their bloodstream (HT x 4 seconds if active, HT x

16 seconds if moving slowly, or HT x 40 seconds if passively waiting, see GURPS: SPACE page 103 for more details). This modification gives subjects a far greater chance of survival if caught in a blowout or otherwise exposed to vacuum. These same blood and bone marrow modifications also alter subjects' metabolisms to make them considerably more resistant to radiation and immune to the degeneration normally produced by prolonged exposure to low or zero gravity.

The Selenite biomod is designed to be widely compatible with other biomods and genemods. By itself, it is not regarded as a "lifestyle choice," and people with this biomod do not consider themselves a subculture.

@TEXT-CSTATS:*Statistics:* Breath-Holding 2 (works in vacuum +30%) [5], No Degeneration in Zero-G [3]; Radiation Tolerance [7].

@TEXT-CSTATS:*Operation:* \$24,000 (\$12,000 subsidized) (4 weeks to grow the tailored nano-viruses, bone marrow, and spleen, 6 weeks recovery). LC 6.

Luna Standard Upgrade 50 points

The majority of people born on Luna since 2068 has the following genemod. Originally designed to produce healthy, productive, long-lived individuals who could safely live on Luna, an analysis of the deaths during the Luna city disaster of 2085 conclusively proved that members of this genotype were at least three times more likely to survive similar incidents. As a result, the LCCU and several large corporations began partially subsidizing the use of this genotype. This upgrade is now available at any hospital on Luna, and more than half of the cost is now covered by the LCCU. Widespread use of this genotype is seen as the best way of making Luna a healthy and safe world, and of minimizing both the cost of medical care and the death toll in accidents. Ziusudra Upgrades that also incorporate the Breath-Holding, No Degeneration in Zero-G, and Radiation Tolerance Advantages are also quite popular, but the parents must pay for the entire cost of such upgrades.

Attribute Modifiers: ST -1 [-10]; DX +1 [10]; HT +1 [10].

Advantages: Attractive [5]; Breath-Holding 2 (works in vacuum +30%) [5]; Immunity to Disease [10]; Longevity [5]; No Degeneration in Zero-G [3]; Radiation Tolerance [10]; Sanitized Metabolism [5]; Reproductive Control [2].

Disadvantages: Skinny [-5].

Features: No Appendix [0]; Taboo Traits (Genetic Defects; Mental Instability; Unattractiveness).

Availability: 2068. *Cost:* \$34,000, \$17,000 after 2085.

Vehicles and Equipment

Grasshopper-class Lunar Hopper

The *Grasshopper* was built by Vosper-Babbage Technologies in 2057, and is one of many workhorse lunar hopper designs. Its powerful metal-oxygen engines are capable of reaching almost anyplace on the moon in just over one hour. It can also capable of reaching lunar orbit, although doing so uses almost all of its fuel and it must refuel at Port Diana before it can safely land. It normally carries up to 16 passengers and 5 tons of cargo. It has a cylindrical hull 24' and 14' in diameter. There are over 100 Grasshopper class hoppers in use on Luna. Among its many other uses, this is the vehicle used by most Lunar Rescue Service teams; although most LRF hoppers replace half of the hopper's cargo hold with 8 more passenger seats for evacuating survivors.

Crew: Commander/Pilot/Navigator (Astrogation, Piloting [High-Performance Spacecraft, Electronics Operation [Communications, Sensors]).

Design: Cylindrical hull (7.5 spaces, aluminum alloy, light frame), cDR/cPF 0.2/1.

Modules: Old Basic Cockpit, Very Small Radar, Radiocom, Lasercom, 0.1 Metal Oxygen Rocket, 4.5 ultra-light fuel tanks (metal-oxygen), 0.1 Power Pack, 1 small entry module, 1 Passenger Seat, 1 Cargo (5 tons).

Statistics: EMass 12, CMass 66, LMass 113, Cost MCr 1.07.

cHP: 10. Size Modifier: +4. HT 12, Maint.: 19.3 hrs.

Performance: sAccel 0.242 G, Burn Endurance 0.45 hours, Burn Points 44, Delta-V 1.2 MPS. No air speed.

Port Diana

Port Diana was built in 2068 as a joint venture by Tenzan Heavy Industries and Vosper-Babbage. It is the only inhabited lunar orbital station and is the place where most large vessels from the other solar system and the Lagrange colonies come to dock. Port Diana has a 240' diameter spherical hull and has docking space for up to 5 large vessels, as well as hangers for up to 5 Kagoshima OTVs and 5 lunar hoppers. It always carries sufficient metal oxygen powder to refuel up to 10 lunar hoppers for their journey back to the surface. Port Diana is a non-rotating 0-g station. To maintain its precise polar orbit over the lunar day-night boundary, it was originally built with an ion drive. In 2093, this was replaced with a less expensive and smaller fusion torch drive.

Crew: Commander (Leadership, Electronics Operation [Communications, Sensors]), Piloting (Low-Performance Spacecraft), 4 Engineers (Mechanic [Fusion Drive, Robotics, etc.]), 2 Medics (Diagnosis, Physician, Surgeon), 6 Cargomasters (Administration, Freight Handling).

Design: Spherical hull (13,824 spaces, aluminum alloy, Light frame), cDR/cPF 7/500 (slag armor), 80 ksf Solar Panels (6.4 MW), Hull Radiators (9 ksf).

Modules: Old Command Bridge, Small PESA, Small Radar, 1 New Fusion Reactor, 18 Hi-

Impulse Fusion Torch Drive, 100 Fuel Tanks (hydrogen), 120 Cabins, 1 Farm, 1 Radiocom, 1 Lasercom, 5 External Cradles (up to 1,000 tons each), 2 Minifac Workshops, 5 Large Entry Modules, 5 Spacedock Hangers (50' x 50' x 50 '), 5 Spacedock Hangers (30' x 20' x 18'), 2 Surgeries, 1,500 Cargo (7,425 tons).

Statistics: EMass 135,750, CMass 143,300, LMass 143,400, Cost MCr 64.4. cHP: 1350).

Size Modifier: +10. HT 12, Maint.: 2.5 hrs.

Performance: sAccel 0.0001 G, Burn Endurance 139 hours, Burn Points 6, Delta-V 0.15 MPS. No air speed.

Chapter 5: Luna City

"Luna City can be a blast, but it takes some getting used to. The wooden walls are really nice and, the floor grass is way better than most carpets, but branches growing out of your wall is pretty odd, even if the fruit is wonderful. Also, the Loonies themselves are a strange lot. About half of them have never heard of the popular InVids, and the way some of them talk constantly about their "reality games" get tedious fast. Still, there's nothing else like the flying dome, and Luna City is one of the friendliest places I've ever visited. It isn't the best spot for a really short vacation. but if you want to live someplace for a few weeks or months, this place is high on my list. Remember to ask a friend to take out to the old city, it's a great place to tell ghost stories"

Jessica Chen, from *Visit Space! An Unofficial Guide to the Solar System*

Name: Luna City

Location: Shackleton Crater

Population: 290,000

SpaceportClass 3

Average Wealth: Wealthy

Control Rating: 3

Luna City is the moon's largest settlement. It is a free city located in Shackleton Crater on the lunar South Pole and it sits on top on one of the moon's major ice deposits. Since a serious accident occurred 15 years ago, it was rebuilt as a living city with the help of Biotech Euphrates.

History

In 2011 lunar orbiting satellites confirmed the existence of substantial ice deposits in several deep craters located at the Moon's poles. The largest deposit was in Shackleton Crater, near the lunar South Pole. In 2031, Deep Ventures, an Anglo-Japanese mining consortium began construction of an ice-mining station a Shackleton Crater. While their efforts were initially designed to supply volatiles to other lunar and orbital stations, by 2045, Shackleton Station was a thriving settlement of more than 1,000 people. This settlement continued to grow and

by 2075, its population was over 100,000 people and it was a lively and cosmopolitan city. In 2068 its population voted and declared Luna City to be a free city, however, it continues to maintain strong ties to both Europe and Japan.

Having grown in a somewhat haphazard and organic fashion, Luna City was a series of tunnels and a few large airy domes built into small craters. While regular safety inspections and frequent repairs had previously avoided all serious problems, on March 29, 2085 nearby construction caused a serious crack in the Papillion dome. Shortly after 2 PM lunar time, the dome exploded, causing severe damage to several nearby tunnel complexes. The resulting panic caused several safety doors to be pried open, further spreading the destruction and pressure loss. A combination of panic and aging infrastructure resulted in the destruction of over 10% of the entirety of Luna City, and the death of more than 4,000 people. In addition, more than 20,000 people had to be evacuated from their homes.

By June of 2085, all the debris had been cleaned up, and the residents whose dwellings had not been destroyed were allowed to return home. However, it was clear that Luna City was getting old and that similar problems could easily happen again. Physically rebuilding the entire city would have been an enormous task. However, Biotech-Euphrates had been searching for a site where they could debut the first of their new living cities. In the first quarter of 2086, the deal was signed and Biotech Euphrates began seeding the ruined portions of Luna City with their new living city. By the end of 2087, this city was habitable and had room for 30,000 residents. Over the course of the next six years, the living city continued to grow. As it expanded outward to cover and consume over half of Luna city, residents living near the living city were placed in temporary housing until they could move into their new quarters in the living city. In an astoundingly successful publicity move, Biotech Euphrates handled all of the residents' moving expenses.

By 2094, the living city had consumed 70% of the old Luna City, and all residents from Luna City had moved into their new quarters. Today, the remains of the previous city surround the living Luna City. The old city, as it is now known, was been stripped of all valuables and vented to vacuum. Although numerous adventure InVids describe it as a popular hideout for smugglers and other criminals, the old city is normally completely empty, except for a small museum devoted to the history and construction of the Luna City. However, visiting the old city carries with it a suggestion of illicit activity, and it is a popular destination for young teens who have passed their vacuum certification and are now able to go out on the surface without being accompanied by an adult.

There are also periodic rumors of forgotten caches of money or other valuables in the old city, but exploration and pilfering by teens for the last 5 years has stripped the old city of everything that is at all easy to find. However, one of the most persistent stories of hidden wealth is actually true. Many Luna City residents have heard that the head of one of the

Martian Triads had been hiding out on Luna City, and that she was killed by rivals shortly before everyone moved to the new city. Before she died, she is supposed to have left the codes for her orbital bank accounts (valued at over 7 million dollars) engraved on some small personal item.

Pei Chen, a deposed Triad boss was killed in Luna City in 2092, and actually left her codes in a chip imbedded in a small ivory netsuke now hidden in a ventilation duct. However, anyone finding these codes will have to face both law enforcement officials eager to confiscate her illegal-gained funds, and the current Triad leaders, who will claim this money for their own. In addition to stories of vast wealth, there are also numerous urban legends about the old city being haunted. Young people frequently tell stories about the ghosts of the Papillion Dome disaster, and morbid teens often visit the site of this tragedy and tell ghost stories.

Inside Luna City

Physical Structure

Luna City is the most unique urban environment in the Solar System. With sufficient access to sunlight and small quantities of water and nutrients, it could theoretically support its inhabitants for thousands of years without maintenance. Anyone coming to Luna City from space will first see the solar collecting leaves. Stretching out across the lunar surface from the city is a vast network of leaf-like structures that covers an area of approximately fifty square kilometers. The individual leaves are thin, flat, circular, and between 0.1 - 2 square meters in diameter. They are all black on the top and pale silvery white underneath. During the bright lunar day, they lie flat on the lunar surface creating the chemical energy that powers this great metropolis. However, as soon as the two-week lunar night falls, every leaf rolls up into a narrow silvery-white cylinder to minimize heat loss. During the day, the city appears to be surrounded by a vast ocean of blackness, while at night it seems to be at the center of a huge silver spider web.

The city itself, is almost invisible from the surface. With the exception of a number of transparent observation domes and several dozen airlocks to the surface, several yards of lunar soil cover the entire city. These observation domes are all seamless and self-polarizing and range between 5 and 30 yards in diameter, while the airlocks are all low round structures, with circular doors that open and close in the manner reminiscent of an eyelid. The observation domes all look like some form of ultra-transparent plastic, the other portions of Luna City that are exposed to vacuum are all extremely colorful for easy recognition and look most like well-worn driftwood that has been polished and painted in bright primary colors.

Inside the city, the walls are normally as smooth as finely finished hardwood and vary widely in color. In public areas, the normal color is a pale rust, brown or green, but the walls can turn

almost any color or color pattern imaginable. The floor is slightly soft, like a grassy carpet over a wood floor. However, the textures of both the walls and floor can vary from smooth metallic hardness to long luxuriously soft fur over a flexible surface like a waterbed. Residents can purchase specially made hormone sprays that can alter the colors and textures of their dwelling. The actual layout of the dwellings can also be changed.

Although most public spaces are larger, private room can be made no larger than 2.000 square feet. However, individuals can spend several thousand dollars to purchase single-use sprays that allow them to add additional rooms to their dwelling. Both new and existing rooms can be shaped to the resident's tastes. In Luna City, purchasing an apartment means either buying one from a resident who is leaving, or purchasing the sprays from the housing office and having the city grow you the desired number of rooms in your preferred location.

The entire city is lit by a series of flat bioluminescent panels that mimic sunlight. At every corner, and periodically along the walls, there are small, flat vine-like excrescences bearing a number of small fruit that vary in size between plums and grapefruit. Coded by color, these fruits include ones with tastes and textures almost identical to apples, oranges, fresh-baked bread, and even cooked chicken. All of these fruits are free for the taking. While most residents prefer to use city-fruit only for snacks, and purchase conventional food in restaurants and grocery stores, some of the poorer inhabitants live entirely off the bounty of the city. Recently, the term *Gatherer* has been used for these people and is an insult carrying connotations of laziness and uselessness.

The city also provides protrusions and hollows that can serve as benches, tables, chairs, and sleeping pads. Many residents purchase conventional furniture for their dwellings, but most of the public areas is furnished in integral city-created furniture. The city also provides all plumbing facilities, and individuals can even use special hormones to create special fixtures that dispense substances surprisingly similar to fruit juice, milk, or beer. Growing a new room takes between two and three days, depending upon its size. However, growing a new piece of built-in furniture like a fruit juice dispenser, bed, or table can easily be accomplished overnight.

However, other than the city's unique structure, life within Luna City is much like life in many other prosperous arcologies. The residents live in rooms off of wide spacious corridors. These corridors converge in large public parks, complete with trees and specially bio-engineered birds, and in squares, where people congregate to shop, drink tea in sidewalk cafes, or eat in one of the city's many restaurants.

Government and Economy

Since the city provides many benefits merely as a byproduct of its existence, living in the city

is free. It costs nothing to merely stay in Luna City and subsist off of the city created food and drink. However, all transactions are taxed on a sliding scale, with the most expensive transactions being taxed more. In addition to selling dwelling-alteration sprays, the government receives a tax of between 3 and 6% on every purchase of goods or information. While cash transactions under \$5.00 are untaxed, everything else is carefully monitored. Like in every other large Fifth Wave city, electronic transactions are far more common than cash.

Ice mining remains one of the cities major sources of income. Today, the city itself sends down millions of hair-fine roots into Shackleton crater. Using organic pumps, the city melts the ice and pumps carefully regulated quantities up for sale and for its own use. The entire process is fully automatic and largely maintenance free. The government of Luna City agreed to give 40% of the revenue it derives from the sale of this ice to Biotech Euphrates as one of the conditions for the sale of their living city. The rest of the money forms a significant source of the city-government's income. The government consists of the same sort of cyberdemocracy currently used in much of Europe. Leaders are chosen by random selection and advised by advanced SAIs. Also, while technically independent, Luna City maintains the same rules concerning bioroids and pantropic rights as the EU.

Luna City is the largest settlement on the moon. It has been the primary transit nexus for Luna since 2067 and since its reconstruction as a living city, it has also become an extremely popular destination for wealthy tourists. Today, tourism is one of its more important industries and visitors can find a wide selection of highly trained and knowledgeable living, SSAI and SAI guides. The rise in tourism has also sparked a rise in gambling, low-gravity sports, and new intoxicants. As a free city, Luna City permits the sale and use of any intoxicant that does not have immediately lethal or medically irreparable effects. Since all drug parlors are required to have a licensed EMT or cyberdoc on the premises, even the worst negative drug reactions can be rapidly dealt with.

One of the most important civic obligations is deciding on the structure of the city. Since the entire interior of Luna City can be easily altered in form and structure, the citizens vote upon such changes. While private dwellings and shops are exempt from changes by anyone other than their residents, all public regions can be altered by popular vote. If someone can get 5% of the city's current population to sign a petition to change a portion of the city, an electronic vote is held upon the topic. However the city's SAIs first describe any advantages or problems such changes would cause, and can over-rule changes that would threaten the safety or prosperity of the city. However, short-term changes in the structure of public spaces, are far easier to effect. All that is necessary is for more than half of the members of a neighborhood agree to such a change. Such changes can normally be kept in place no longer than one week.

Luna City is still expanding, and is gaining enough space to house an additional 2,000 people every year. While the SAIs lay out the initial plans for all new neighborhoods and districts,

citizens can vote to choose between the four or five different options presented by the planning SAIs. Making temporary changes in currently uninhabited sectors only requires an inexpensive permit from the city government. Various recreationists and reality gamers (see below) often use these areas for their more extensive entertainments.

Such changes can remain in place until people wish to move into the new district.

Culture and Society

Luna City is an extremely cosmopolitan metropolis. Members of many different cultures, sub-cultures, and clades live side-by-side in relative harmony. Initially, the old Luna City was a joint Euro-Japanese venture and inhabitants from nations as diverse as Japan, Spain, and Norway all lived in close proximity. While the city is now far less crowded, the legacy of these early days remains. Japanese VR gaming parlors, Danish brothels, and Spanish cafes all sit next to each other on the streets of the living city. Also, both diversity and interaction are encouraged in all neighborhoods. Ever since Luna City was founded, there have been weekly and monthly social gatherings ranging from small "block parties" to festivals celebrating Lunar Sunrise, various sporting events, and popular ethnic holidays like Christmas, Bastille Day, or the Japanese Children's festival.

Even the growth of radical sub-cultures and clades has done little to disrupt the unity of Luna City. Residents may be an exceptionally devote members of various religions, or elective hermaphrodites with no obvious gender, but they are still expected to take part in the local festivals and socialize with their neighbors. Even members of the most extreme clades, like hives, are expected to participate in these functions. Residents of Luna City normally spend a great deal of time with their neighbors. They typically eat more than half of their meals at local restaurants where neighbors exchange news and gossip.

Of course, this sense of community is not without negative consequences. Failing to participate in the social life of your neighborhood is seen as a personal failing and people who isolate themselves are regarded with suspicion and distrust. Members of highly intolerant religions or reclusive clades like Virts normally do not move to Luna City. Also, gossip is a constant feature of life in Luna City. The little privacy present here is carefully guarded, since secrets can be very difficult to keep.

Discrete gatherings, whether for illegal commerce, sensitive business deals, or romantic interludes are as important here as elsewhere, but they are handled somewhat differently. A number of restaurants, bars, and private clubs provide specially designated privacy rooms. Such establishments have a separate a section in the back that contains a dozen or more small, pleasantly furnished rooms. Businesses with privacy rooms make a point of maintaining no sensors other than legally mandated atmosphere and pressure monitors. Also, these rooms are

shielded against all external transmissions and no attendants or other staff members ever enter these areas. While it may be obvious that someone is going into a privacy room, the lack of sensors and the multiple entrances ensures that no one will know who they are going to see.

The use of privacy rooms works largely because everyone agrees to ignore everyone who enters or leaves them. However, anyone who spends too much time alone is regarded as both suspicious and somewhat uncivilized. Watching InVids and many other activities that are performed alone or at least in one's dwelling elsewhere, are normally public activities Luna City. There are local clubs where the members watch and discuss the news and bars and cafes where the regulars meet to watch various sports teams or InVid series.

Much of the in-person socializing that makes up the heart of Luna City culture actually has an extremely practical basis. Luna City is the only large settlement on the moon, and both the Lagrange colonies and Earth are approximately a quarter of a million miles away. As a result, real-time on-line chatting with anyone off of Luna is somewhat distracting due to the additional 2.5 second delay between saying a statement and hearing the response. Also, while playing earth-based V-R games is possible, the time lag makes them somewhat unreal and difficult to enjoy. As a result, the citizens of Luna City are somewhat separated from both Earth's billions and the nearly one million Lagrange colony residents and have had to rely upon in-person interactions and location-based communities in a way that many inhabitants of Fifth Wave nations regard as both eccentric and archaic.

The Flying Dome

When the new Luna City was being constructed, Biotech Euphrates asked for the inclusion of a large dome where its young Camazotz parahumans (see GURPS BIO-TECH page 47) could practice flight. Currently around 1,500 Camazotz parahumans now live in Luna City. Biotech Euphrates is currently evaluating this genotype for any unforeseen problems and in return for a small stipend, it runs periodic medical checks on all Camazotz parahumans. While the Camazotz were born and raised in a higher gravity to strengthen their bones, they were all moved here when they were all 5-8 years old.

A few of these Camazotz plan to emigrate to Titan, once lightweight insulating suits have been developed, others hope to fly through the skies of Mars when the terraforming is mostly completed in a few decades, and some have become happy with their life on the moon. However, most hope to eventually be a part of the first crewed expedition to the planet Darktree. These parahumans hope to eventually colonize this world after a 60+-year journey in nanostasis.

Darktree

Darktree is a satellite (astronomers differ on whether to call it a "moon" or a "planet") of the brown dwarf star Xiang-63 (number 63 in the Xiang catalogue of anomalous infrared sources). Discovered in 2017, it is the nearest stellar neighbor to Sol, only about two-thirds of a light-year away in the general direction of Cygnus

Xiang-63 has about 0.064 times the mass of Sol (about 65 Jupiter-masses, or 20,600 Earth-masses). Its radius is about 34,100 miles, making it somewhat smaller than Jupiter but considerably more dense. Effective surface temperature is about 1300 kelvins. The total (bolometric) luminosity of the star is about 0.000016 times that of Sol, but the vast majority of its output is in the infrared -- visual luminosity is about one-billionth that of Sol. Xiang-63 is apparently about 5.8 billion years old, or about a billion years older than Sol.

Exploration of the system proceeded through infrared observation and remote probes launched by Mars Academy of Space Technology, NASA, and the European Space Agency, and funded by various corporate sponsors notably Nanodynamics, Xiao Chu and Biotech Euphrates. The first close-up imagery was provided by the Herald 1 remote survey vehicle swarm, consisting of several hundred tiny magnetic sail-propelled probes boosted by particle beam. In 2069, they returned images of the Xiang-63 system, revealing the existence of an interesting planet. More ambitious follow-up probes are approaching the system, and plans for a multinational manned mission continue to progress.

Darktree follows an effectively circular orbit around Xiang-63 ($e < 0.01$) at a radius of 1,174,000 miles. The orbital period is 2.073 standard days.

Darktree is tide-locked to its primary. Darktree is spheroidal in shape, although it is noticeably distorted by tidal effects (in effect, there are vast highland regions at the center of the "hot face" and "cold face" of the world). The planet's average radius is 2,630 miles. Density is 5.0 g/cc, mass is about 0.265 Earth-masses, and the average surface gravity is 0.63 G. Darktree's most unusual feature is its dense atmosphere. At sea level the atmosphere exists at about 2.35 times Earth-normal pressure. This and the naturally low gravity mean that Darktree, despite its small size, actually has a gaseous envelope several times thicker than Earth's. What planetological processes gave rise to this thick blanket of air remain a mystery. The atmosphere is primarily composed of nitrogen and carbon dioxide, but it also has a small admixture of free oxygen.

Humans on Darktree must use respirator masks to concentrate oxygen and filter

out much of the carbon dioxide, but the atmosphere is otherwise unusually hospitable to Earth-born life. The thick atmosphere has several beneficial effects on Darktree's climate. The "hot face" of the planet enjoys an average temperature of 285 kelvins (53 degrees F). Meanwhile, atmospheric circulation is sufficient to keep the "cold face" above temperatures that would otherwise cause the bulk of atmosphere to freeze. Thus, although water vapor freezes out a few hundred miles from the terminator, and carbon dioxide freezes out before the "cold pole" is reached, the atmosphere's nitrogen and oxygen remain gaseous throughout. Geological processes return water and carbon dioxide to the "hot face" over time, replenishing the atmosphere and permitting Darktree to host life.

Darktree has a Ring Ocean in the "twilight" zone between the hot and cold faces. There is a permanent air current pulling surface air toward the center of the hot face, where it rises and begins to circulate back toward the cold face. As these winds cross the Ring Ocean, they pick up water vapor which is rained down upon the heatward lands. This creates a large habitable zone, from a few dozen to over a thousand miles wide on the heatward shore of the Ring Ocean. Here are Darktree's famous "fog forests." Darktree's dominant plant forms are evolved to live almost without visible light, using great height and wide leaves to drink in the primary's infrared emissions. The fog trees support a complex ecology of native animal forms, including a few which are comparable to Terran mammals in intelligence. Meanwhile, the Ring Ocean and the cold-face lands are nearly barren.

Most life on the cold face is limited to the immediate vicinity of geo-thermal vents, using thermophilic and sulfur-based biochemistry. (A couple of notes of local color: from anywhere on Darktree's hot face, the primary is visible as a dull-red disk about 1.66 degrees across, or about three times the apparent diameter of Earth's sun or moon. It is about twice as bright as the full moon as seen from Earth, although since the light is more diffuse it might well look dimmer. Atmospheric absorption of red and IR wavelengths might also cut the apparent brightness down a bit.)

Luna City's flying dome is 1,000 feet in diameter. The central 200 feet protrudes above the surface and is fully transparent, revealing the full glory of space. Here, the bat-winged Camazotz can fly with ease. While this dome is reserved for their use for 6 hours every day, the rest of the time it is open to everyone. Every day hundreds of lunars and visitors strap on lightweight plastic wings and attempt to fly. A number the Camazotz earn money putting on flying shows and giving flying lessons to non-winged humans. The flying dome is one of Luna City's most popular tourist attractions.

Biotech Euphrates recently completed a smaller dome that simulates Darktree's dense carbon dioxide, oxygen, nitrogen atmosphere, giant forests, and dim red light. Here, the Camazotz can experience a version of life in their new home. For a small fee, other humans can put on respirator masks, cold weather clothing, and imagine themselves visiting this exotic world.

Reality Games

Since many V-R games are less accessible to people living in Luna City, they have evolved their own entertainments. The city's strong communal atmosphere, combined with the fact that both dwellings and public spaces can be temporarily reshaped, allows other forms of entertainment that actually take place in reality. In their most extreme form, these reality games involve reshaping a uninhabited sector of Luna City into a representation of the game's setting, everyone dresses up in costumes, and that game normally takes place over the course of one to seven days. These games range from elaborate court dramas set in 17th century France, to outer space adventures based upon the popular Starburst InVid. Some reality games even rent the use of the simulated Darktree dome and play at exploring an alien world.

While reality games set in imaginary places or other times are receive the most publicity, more realistic games set in the present day, where individuals play themselves are more popular and a more distinctive feature of Luna City life. In these games, individuals lead their normal lives, except that they also participate in an ongoing story where they are also spies, terrorists, or even members of a hidden cabal of powerful magicians. Unlike many similar games, the events of the reality games are interwoven with rest of the individual's life. Game moderators track the movements and activities of players, participants receive electronic messages at any time during the day or night, and all events take place in real time. Members regularly meet in each other's homes, or in clubs, or restaurants set up to specifically fit into the ongoing story line. The participants' VIGs or IVIs provide additional setting details, including various special effects. Participants frequently plan missions electronically, meet to discuss and execute their plans in person, and then share their success or failure with other ersatz magicians or secret agents in dimly lit spy or mercenary bars.

The action sequences usually take place in uninhabited areas specially formatted by the games' moderators, or in the homes of other participants. Other players normally play a group's primary opponents (often a team playing thieves will be opposed by another team playing undercover law enforcement agents). The games' moderators play numerous minor roles and program cybershells or bioshells to take the part of victims, informants and other less important characters.

These games serve as highly entertaining distractions for people leading otherwise unexceptional lives, as well as providing opportunities for people to meet each other and perform actions they would otherwise only be able to only experience second hand. If

appropriate release forms are signed, the players can even use a limited selection of non-lethal weapons. Only electrolasers that have been modified so they can only be used on the stun setting, and pistols that fire harmless tranquilizer darts are allowed, but such weapons give the games an extremely high degree of realism. Since bystanders can also be hit with such weapons, participants are expected to post both physical and virtual signs around the vicinity to warn outsiders of the (admittedly small) risk. Some outsiders enjoy watching reality games and are invited by the moderators to take the part of bystanders and civilians.

Since almost 20% of the population of Luna City has played such games occasionally, and more than 10% of the population are regular players, participation in such games can be used to explain all manner of eccentricities. In this highly social and gregarious society, reality games offer a secret escape from normal life, and a risk-free chance to experience a secret, exciting, and dangerous existence.

Lurid InVid dramas sometimes contain segments about thieves and terrorists masquerading as reality game players until the actual theft or bombing occurred. The fact that a criminal gang recently completed several thefts using reality games as a cover has recently lead the Luna City board of governors to enact legislation requiring all on-going games to be registered. There are also rumors that criminals and terrorists have actually recruited people who excel at reality games. One popular InVid drama recently showed a tale of someone being recruited into what she were told was a reality game, but actually turned out to be a criminal conspiracy.

The Hidden Sectors

Luna City could now hold a population of up to 300,000, and in time could grow to contain an almost unlimited number of people. As in most other Fifth Wave cities, powerful computers use minute electronic sensors to keep track of the movements and activities of people in all public places. In addition, all private residences are equipped with sensors to detect air pressure and composition, as well as temperature and the presence of biological activity. The city council uses these sensors to keep track of the populace and the safety of the city. However, these sensors are not an integral part of the living fabric of the city, so there are a few areas that are beyond their reach.

Using the correct hormone sprays, people can easily create small packets within the city that are cut off from all normal contact with the rest of the populace. These pockets can consist of everything from a single small dwelling to an area covering several thousand square meters that houses over 100 people. Although the hormones necessary to create such spaces are supposed to be licensed and controlled, like everything else, they can be acquired for the right price.

Currently there are almost 1,500 undocumented residents living within Luna City. None of them can venture into the public rest of Luna City without the use of special electronic counter-measures - otherwise the city's sensors would detect both the opening of a portal into the main city and the presence and movements of previously unknown residents.

Becoming an undocumented squatter within Luna City involves paying someone for both the correct sprays and the location of one of a few unmonitored tunnels in the old city that leads to the exterior of the living city. Communication with the outside world can either be accomplished through these same tunnels, or by using another spray to open a passage into the dwelling of a contact within the normal portion of the city. Such contacts always have the sensors within their rooms altered so that they ignore the opening of such portals.

Most undocumented residents are smugglers and moderately prosperous criminals either hiding from pursuit or using the undocumented regions as a place to safely transfer stolen goods to a buyer or a fence. However, these residents also include several rogue AIs in cybershells or bioshells, as well as a terrorists cell. The second largest undocumented settlement is a group of 47 members of the Blue Shadow terrorist organization who use their portion of Luna City as a transfer point for Earth and Lunar-made nanotech and bioweapons. Lunar authorities now suspect that Luna City is being used as a transshipment point for these weapons and is currently conducting discrete investigations. They are currently seeking reliable individuals with no known law-enforcement connections to pose as weapons buyers.

The Trojan Mafia maintains a "store" in an undocumented zone, where wealthy buyers can purchase nuclear devices and other illegal weapons systems. Due to the difficulties of transport, the weapons themselves are not kept here. This location is merely a secure place where deals can be negotiated, and where buyers can be hooked up to advanced lie detectors to make certain they are not undercover law enforcement officials. A few of the undocumented regions are used as entertainment parlors for illegal activities ranging from lethal gladiatorial combat to brain hacking and xoxnapping.

The largest and most prosperous groups of these squatters are the members of the Lynx Crew, an Anglo-Japanese branch of the Yakuza. This criminal syndicate sells various illegal products to Luna City residents. Using goods they purchase from Earth, or steal from storehouses, the Lynx Crew sells luxury foods and similar goods at reduced prices, as well as offering xoxnapped celebrity Shadows, illegal drugs and various other illicit consumer goods. Members of the Lynx Crew living in the documented areas take orders and payments, then small disposable robots use illegal hormones and short range jamming equipment to carry the good directly into the houses of the buyers, eliminating almost all risk of detection.

Luna City law enforcement officials are currently attempting to track down the members of the Lynx Crew, but have so far had very little success in locating these wealthy and clever

criminals. Since the Lynx Crew largely avoids violence, they are also popular heroes among some of Luna City's less prosperous residents, a fact that further hampers investigations. Although the actual crime has not been discovered, recently the Lynx Crew opened an electronically concealed portal into the room of the famous singer Helen Mathenge and illegally created a Shadow of her while she was sleeping. The Lynx Crew is now offering copies of this Shadow for sale.

Visiting Luna City

Luna City is quite open and accessible. Its close ties to the European Union and Japan means that visitors from these states and their close allies can enter freely after they have gone through a brief identity check to determine if they are criminal fugitives. However, even welcome visitors must also undergo a detailed, but quick and non-invasive scan to see if they are carrying any dangerous technologies or weapons. Visitors from the TSA and other states or colonies with particularly lax laws about dangerous technologies or a history of hostility to Europe or Japan are searched more thoroughly, but unless evidence of illegal activity is uncovered, Luna City customs rarely takes longer than 30 minutes. There are no fees to enter Luna City, but all visitors are informed about the tax on all transactions.

Illegal visitors who enter the undocumented sectors face none of these checks, but typically must pay many thousand dollars or more to enter and anyone without guards, allies, or other protections could also face robbery if they deal with particularly unscrupulous entry brokers.

Luna City External Relations

In addition to having good relations with both the EU and Japan, Luna City also has close ties to Clarke-1 and Starburst Station. Trade and visiting between these colonies and Luna City is quite common. When Clarke-1 first became independent, a number of Luna City residents donated money and skills to help the Vacs transform their station into a thriving colony. Joseph Rosen has come to speak at Luna City several times, and several dozen Vacs now live there.

However, there is a strong commercial and ideological rivalry between Luna City and Islandia. As the two largest off-earth settlements, many people in these two colonies each see their own colony to be the exemplar of off-Earth existence. The contrast between the strong communal spirit of Luna City and the rampant individualism and subcultural segregation of Islandia has served to

turn their commercial rivalry into something considerably more bitter.

Although no one expects actual violence to erupt between these two colonies, minor trade sanctions have occasionally been imposed, and if relations become any worse an all-out trade war could be declared. Since the Duncanite-controlled Shack is closely allied to Islandia, relations between Luna City and the Shack are also far from cordial. This stress combined with the preservationist ethics common in Luna City means that many Luna City residents regard all Duncanites to be little more than world-destroying anarchists.

Luna City Adventure Seed

Luna City authorities believe that the Lynx Crew has recently acquired a shipment of a secret experimental drug that produces extreme euphoria. This drug also leaves its users extremely suggestible. Worried that the Lynx Crew will sell this as a new recreational drug and use its side effects to "program" citizens to aid their criminal endeavors, the authorities have hired or otherwise recruited the services of the PCs to recover the drug and if possible, to capture the Lynx Crew.

Since the Lynx Crew knows the identities of all Luna City law enforcement personnel, the authorities have been forced to recruit outside help. The authorities can help the PCs set up identities as criminals attempting to join the Lynx Crew, or they can give the PCs the names of several suspected Lynx Crew contacts and allow the PCs to pose as drug buyers.

6 L4: Cities in Space

The first human-made object in the Lagrange points were placed there in 2031. In this year, a large orbital telescope was placed in each Lagrange point, to allow exceptionally precise long baseline interferometry. A few years later, new research revealed that while high quality electronics and pharmaceuticals could be manufactured in Earth orbit, the minute traces of atmosphere and microscopic tidal forces prevented the utilization of still more precise methods of manufacturing. In 2037, Morimoto Microtronics placed their first orbital manufacturing station in L-4. Several hundred thousands miles from any other human habitation, 22 people working in an automated factory created the highest quality microchips ever made. Within a few years, several other electronics and pharmaceutical firms placed stations in L-4 & L-5 orbit, beginning of the colonization of the Lagrange points. In 2043, the population of each Lagrange point passed 1,000, and by 2050 more than 10,000 people were living and working in L-4.

At this point, a large number of companies saw future opportunities opening up for a wide range of good and services. The earliest Lagrange stations were small, primitive 0-g stations. While inexpensive and easy to construct, personnel had to be rotated back to Earth every few months to avoid serious health problems. By 2050, stations that either rotated or contained rotating portions that provided some level of artificial gravity had replaced most of these early habitats. However, these newer stations were still very cramped, and during solar flares all residents had to crowd into tiny, crowded radiation shelters.

This situation changed in the fifth decade of the 21st century, when System Technologies and Tenzan Heavy Industries started construction of Islandia, with heavy investment from both the European Union and Japan, as well as individual corporations in the United States. Before that point, development in L-4 and L-5 had been about equal. However, the creation of a huge station capable of holding many thousands of people drew others to L-4. By 2055 almost a dozen smaller space colonies were under construction in L-4. Construction was steady enough that instead of each corporation importing workers from Earth, a permanent crew of construction engineers began living in L-4. These skilled technicians built the numerous colonies using materials shipped up from Luna and Earth, and mined from asteroids moved into Lagrange orbit.

The population and diversity of L-4 continued to grow, and by 2060, more than 50,000 people lived in these colonies and factories. The Duncanites' announcement of a development a gene sequence that overcame the problems associated with 0-g further increased interest in space colonies. Both the possibility of children who could be safely raised in 0-g and the development in 2068 of a biological nanotech therapy that would grant the similar advantages to adults led to the creation of a number of low and 0-g colonies.

Today, the populations of both L-4 and L-5 continue to grow. Also, since almost everyone born in space and the majority of immigrants from Earth all possess at least limited resistance to both 0-g degeneration and radiation many of the newer colonies are far less earth-like than early settlements like Islandia. 0-g colonies are still fairly rare, and are normally only inhabited by individuals born and raised in space. Since some level of weakness results from long-term residence in 0-g, most residents do not wish to give up the chance of easily visiting earth again, and few people born on any planet are truly comfortable giving up all sense of up and down.

However, some new colonies have been built with artificial gravity between lunar gravity and 0.5 Earth gravity. There is even some speculation that Martian gravity may become standard gravity for new stations built throughout the solar system. These low-gravity stations allow residents to preserve a normal sense of up and down, as well as allowing them to easily visit Luna, Mars, and Titan. However, low-gravity colonies are less expensive to construct and can be made smaller without risking the dizziness and disorientation that the rapid rotation produced by small colonies kept at Earth gravity. Currently, the most common new colonies are inexpensive shell habitats carved directly from asteroids. However, small bernal spheres capable of holding between 7,000 and 15,000 people are also popular with colonists who wish more open space.

Older construction techniques favored large toroids, but they have recently proven to be more expensive than either shell habitats or spheres. Between 2080 and 2100, 40% of the new colonies were shell habitats holding between 5,000 and 10,000 residents and another 30% were 2,000' diameter Bernal spheres designed to hold between 8,000 and 10,000 people. Using standardized construction techniques, these colony styles have proven to be both the most popular and the cheapest of the easily constructed designs.

However, the ever-increasing numbers of Tenjin parahumans and the increasing use of 0-g adaptation biomods has meant that the number of 0-g colonies has also been increasing. Since Tenjin parahumans are also highly resistant to radiation, and many also possess biological nanotech that gives them additional radiation protection, their colonies can be built extremely cheaply. The standard Tenjin habitat is a stony or nickel-iron asteroid with numerous tunnels and large chambers bored into it.

In addition to building habitats on asteroids that have been directed into the Lagrange points, Tenjin living in the belt who wish access to the prosperity and commerce of the Earth-Luna system have recently mounted fusion drives on several asteroids and are now maneuvering them into L-4 or L-5 orbit. Predictions indicate that while only 15% Lagrange colony residents now live in 0-g colonies, if current trends continue, this number will rise to more than 50% by 2130.

Most colonies are built by advanced cybershells working with and directed by human construction workers. Currently, the majority of these workers are Tenjin parahumans. The number of vacuum adapted parahumans, included both Void-Dancers and Vacs (see below) in these professions is still small, but continues to rise.

To cut costs, a few construction firms have also begun using low-cost vacuum-adapted bioshells for many routine tasks. This move has produced unrest in the orbital construction union, and the use of such bioshells is currently considered somewhat controversial since it could eliminate a number of the less highly skilled construction jobs. Currently negotiations are underway to insure that only jobs previous performed by cybershells will done by the latest batch of bioshells.

Islandia

"Open skies, clouds, real rain, normal gravity, and all the recreational substances you can afford - what more could you ask for? You have your choice of mild temperate seasons and the perpetual early summer of the tropics, complete with daily rains. The taxes are even low. The folks who built this place were aiming for paradise in space, and they came pretty close. Of course, paradise isn't always cheap. Living space, electricity and similar necessities are all paid for in your taxes, but you buy everything else, and prices can be pretty steep. Everything that can't be built here is imported from Luna or Earth, and "everything the market will bear" is the motto of most retailers here.

This place isn't the cheapest option for a vacation, but you'll have a good time, especially if you are into extreme sports. I don't recommend actually trying any of these crazy games, but actually watching some of the better death junkies battle sharks, each other, or the forces of nature in person is better than any slink""

Jessica Chen, from *Visit Space! An Unofficial Guide to the Solar System*

Islandia Statistics (for each cylinder)

Subsystems Cylinder Hull, Solar Panels

P&P 16,000 Solar Panels, 200,000 ksf

Armor (cDR)

Hull: 20

cPF

Hull: 100

Equipment

Modules: 2 Old Command Bridges, 2 Medium Radar, 2 Small PESA, 3,000 Habitat, 2,000 Farm, 200 Factory, 1 Robofac, 3,000 Open, 4,000 Park, 1,000 Plaza, 10 large Entry Modules, 2,000 Surgeries, 500 Cyberdocs, 5,000 Space Spacedock Hanger, 100 Labs, 100 Minifac Workshops

Statistics

Dim: 1.5 miles x 1.5 miles x 5 miles *Mass:* 360 million tons.

Volume: 132 million internal spaces. *Price:* M\$ 163,000.

Population 248,500 in each cylinder

SpaceportClass 4

Average Wealth Wealthy

Control Rating 2

History

In 2049, the first wave of L-4 settlement had begun. At this time, a coalition of economic interests headed by the E.U.-based System Technologies and the transnational Tenzan Heavy Industries decided that their goals would be best served by creating a large station to serve as a major space port and a trade city. Suspecting that humanity would soon expand throughout the solar system, this coalition hoped to create a space station that could serve as one of the primary points of departure and arrival for ships heading to and from the Earth-Luna system. Located away from any large gravity well, the fuel-savings for docking at Islandia was considerable compared to low Earth orbit or landing on Luna. The investors hoped that Islandia would out-compete the planned Chinese Taiko Station spaceport as the major off-Earth spaceport

The consortium also wished to attract large amounts of commerce and important 0-g research and manufacturing facilities. To accommodate all of these diverse goals, they planned to build

a truly vast station. After much planning, the engineering team decided to construct a pair of Cole habitat cylinders. A single long, slender nickel-iron asteroid was captured and cut into two equal portions with great solar mirrors. Then, both pieces were melted and inflated into a pair of huge cylinders. Construction was completed in 2057, and the colonies were opened for habitation on January 1 2059. Offering earth-normal gravity and open sky, and living space for up to 1,000,000 people, Islandia attracted residents who would not otherwise have considered living off of Earth. The two habitat cylinders were differentiated by climate, one (known as Warm) has a range of sunlight and temperatures similar to Hawaii, while the other (known as Cool) has a temperate climate similar to France. Initially, only the tropical cylinder was used for habitation - the temperate cylinder was reserved for farming and industry that required gravity and atmosphere. However, by 2067 the population of Islandia had risen to over 50,000, and both cylinders were opened for habitation.

Since that time, Islandia's population rose steadily, reaching its current level in 2093. Today almost half of the population of L-4 lives in these two cylinders. Islandia's open entry policy, and its declaration of pantropic rights means that it has become a Mecca for various neo-human clades. Today, over a third of its population consists of bioroids who have worked off their indentures, clone families, and various elective neo-human clades.

Inside Islandia

Islandia is the most populous station in L-4. As a result, it is the cultural capitol of L-4, and the only Class IV spaceport in either Lagrange point. It consists of a pair of counter-rotating cylinder, each one is 5 miles long and 1.5 miles in diameter - the two cylinders are held 3 miles apart by massive composite girders. Each cylinder has one end-cap made almost entirely of steel-hard 0-g glass. Large mobile mirrors opposite these great windows focus sunlight into the colonies so that they both experience a normal 24-hour day-night cycle. With a gravity of 1.0 g, and large expanses of open parkland and working farms, Islandia is by far the most Earthlike of any off-Earth habitat. It even possesses naturally generated clouds and normal rainfall. With a population of a population of 497,000, split evenly between the two cylinders, Islandia is also the most populous station anywhere in the system.

The space between and the two cylinders is used for 0-g industries. These factories, including one 0-g robofac, and the factories inside the two cylinders allow Islandia to produce a wide range of goods for both local use and export. The space between the cylinders also houses a spaceport capable of repairing and refitting any ship in service. This spaceport also contains a shipyard that regularly constructs standard short-range craft and a limited number of small and medium sized cargo and passenger vessels.

Government & Economy

Islandia is a "free city", as well as a tax-free commerce zone. It is ruled by a combination of a business council and direct democracy. The business council serves as the executive body, while the citizens vote upon all laws. Citizens can overturn business council rulings, but only if they can muster a 67% majority.

Residents, industries, and businesses must all pay monthly taxes based upon the amount of land area and resources they consume. However, once these taxes have been paid, air, water, and the lowest grades of gene-modified food are free, and all commercial transactions are both untaxed and unmonitored. The only limit on commerce is that advanced sensors and skilled port inspectors make certain that human slaves, weapons of mass destruction and other illegal substances and devices are not brought into or manufactured in Islandia. With that exception, everything else can be freely bought and sold.

However, while residents pay no taxes on the sale or purchase of goods, anyone exporting goods from Islandia must pay a customs fee equal to 8% of the goods' value. However, no one is required to state the actual nature of their exports. Instead, people are simply asked the value of their goods and their responses are verified with advanced lie detection technology. Since anyone who lies then has their goods opened and appraised, few people attempt to evade these taxes. These fees make up the majority of the colony's income. Islandia earns the rest of its income from docking fees on the many ships that come to trade there, and from the sale of imported and locally made goods to the residents of the many colonies that lack Islandia's resources and production capacity.

The limit on slavery was part of the colony's initial charter and has been re-interpreted over time. In 2089, bioroids were ruled to be both fully human and exempt from indentures. Currently, all uplifted animals that exhibit both near human intelligence and contain human genetic material are now considered to be human. However, indentures of no more than 30% of a sapient's natural life span are not considered slavery for uplifted animals. Also, SAIs are not protected by these any of these laws. There is currently much discussion on expanding the anti-slavery laws to make all indentures illegal. The business council opposes this move, but it has growing popular support. In the most recent vote, 61% of the citizens voted to end all indentures and to make future indentures illegal. SAI demographers predict that this change will occur by 2103 unless some event occurs to alter popular opinion.

Some local pantropic rights activists are also proposing that the anti-slavery laws be expanded to include SAIs. The business council is strongly against this change and the most recent popular vote on this issue resulted in only 34% of the citizens voting for such rights. Currently, all but the most extreme pantropic rights groups are primarily concentrating on ending indentures.

Living Space

Each of Islandia's cylinders almost equals the population of Luna City, and neither of them is even half full. With abundant living space, 1.5 miles of open sky between the surface of the cylinder and the other side, natural clouds and rainfall, Islandia is by far the most open and airy settlement not located on Earth. In fact, Islandia is currently less crowded than many of the more crowded and dense earthly cities. The basic tax on living space is such that even the poorest residents can afford comparable- sized apartments to what they could find on Earth, while the wealthiest citizens live in large villas surrounded by up to several acres of parkland.

The amount of parkland and farmland in Islandia typically surprises visitors, especially visitors who have lived on Luna, the asteroid belt, or in other L-4 or L-5 colonies. While most of the colony's food comes from advanced hydroponic gardens, approximately 20% of it is grown in high-quality dirt-based farms. Here locals can acquire coffee, tea, fresh fruit, and fresh herbs. Islandia is widely known as having the best coffee off-Earth, and while its wine and brandy cannot compare with the finest French vineyards, both are regularly consumed by the wealthier residents of Luna and the Lagrange colonies. Also, more than 20% of Islandia is parkland that is open to all residents. Some of this land will be developed as the population expands, but almost one third of the moderately priced dwellings are actually built underneath hills and hummocks to help preserve more green space. Also, most residents live in tall apartment complexes, much additional living space can be created with minimal impact on the colony's open appearance.

Society:

Like Luna City, Islandia is a highly cosmopolitan, extremely diverse urban area. Since many people come into space to leave the prejudices of Earth behind, the number of parahumans and individuals belonging to unusual clades is quite high compared to any earthly city. While anti-parahuman bigotry certainly exists on Islandia, almost 15% of the citizens of this colony are visibly parahuman, so the open bigotry common in some earthly cities is far more difficult here. Instead, even the bigots find themselves thrown together into identity-based neighborhoods and communities.

These neighborhoods are one of the key features that differentiates Islandia from Luna City, and from most smaller space colonies. In addition to belonging to highly diverse electronic communities, the residents of Islandia tend to live with others belonging to their own clade, sub-species, nationality, religion, or whatever other distinction they feel is of primary importance.

Such divisions are often formalized to a degree uncommon on much of Earth. Many apartment complexes are inhabited by members of a single identity group like Virts, Buddhists, actors, fur-bearing anthropomorphic animal fans, Chinese surname associations, members of a single African tribe, fans of a popular InVid series or sports team, or even voluntary

hermaphrodites. However, while inter-identity prejudice is common, unlike the ethnic neighborhoods of the 20th century United States, actual oppression is largely impossible since none of these groups comprises more than 12% of the population. However, inter-identity violence is moderately common in some of the poorer neighborhoods. Rival ethnic groups, religions, and sports teams perform the majority of such violence. While the most serious incidents have never escalated above a few dozen people brawling, and on rare occasions a single murder, the board of directors of Islandia remains concerned that one of these incidents could escalate into a full-scale riot.

The various identity groups help maintain order in the colony, and most police the actions of the members. As a result, while there is friction between the various groups, within themselves, the various identity communities are all fairly orderly. Anyone who does not belong to a group will find themselves socially isolated, especially since much of the colony's networking involves making contacts through your own group. Less than 10% of Islandia's population lacks a strong membership in an identity community, and most of these individuals are newer residents who will gradually develop ties to some community.

Privacy

One of the contrasts of life in Islandia is that while identity communities are the center of life in Islandia, this colony also has an extremely strong privacy ethic. The business council is determined to allow Islandia to be a free port where all relatively safe goods and services can be bought and sold without hindrance. As a result, the local rules about privacy are very tight. Everyone who does not wish to be photographed by the various cameras people and their robots use constantly need only wear a special privacy transmitter. Signals from these transmitters cause all legal video equipment to blur out all images within 1.5 meters. All electronics brought into Islandia must be fitted with receivers and software so that they block images near privacy transmitters. While the free nature of commerce on Islandia means that non-licensed transmitters are occasionally used, being caught with an illegal transmitter carries a heavy fine. On this colony, invading someone else's privacy is never a causal matter. However, privacy transmitters must be worn openly and anyone wearing one is assumed to have something interesting or potentially profitable to hide. Skilled free-lance surveillance expert sometimes follow and physically listen in on people wearing privacy transmitters. As a result, the most privacy conscious residents also hire bodyguards to prevent such intrusions.

Law Enforcement

One of the drawbacks of life on Islandia is that its Earth-like appearance has led many residents, especially recent immigrants from Earth, to forget that violence and vandalism can have consequences that are far more serious than similar acts on Earth. The leaders of Islandia vividly remember the incident where serious factionalism in Brigham's Rest, a Mormon-only

L-5 colony, lead to violence that depressurized the entire colony and killed 2,940 of the colony's 4,200 residents. As a result, the directors use memetic programming to keep the level of violence in check. Subtle murals, background music, and even aerosol scent dispensers designed to reduce violence are present in all public places.

While the various identity groups deal with the punishment of minor brawling and petty theft, aided by paid mediators. However, the Islandia Emergency Force handles serious property destruction, major theft, and personal violence that requires significant medical care.

Answering only to the business council, the IEF can request private recordings and other normally secret information to aid them in their investigations. Such records combined with access to all of the colony's many cameras, and the ability to over-ride privacy transmitters allows them to quickly identify and locate suspects. Once enough evidence has been gathered the criminal is arrested, and a hearing is held by a licensed mediator to determine if the evidence is sufficient to warrant brain scanning the individual. If there is sufficient evidence, then technicians create a Shadow copy of the individual's mind and examine the Shadow's memories to determine both the events and the actual motives.

Anyone convicted of theft or similar property crimes is required to pay a fine equal to twice the value of the goods stolen, or three times the goods' value if they are damaged or destroyed, or if their value is otherwise reduced. Half of this fine goes to the business council, the rest to the owner. Offenders found guilty of relatively minor violent crimes or ones with sufficient extenuating circumstances are reformed using advanced, involuntary memetic therapy to ensure that they do not engage in such actions again. More serious criminals are given the option of exile or being subjected to minor psychosurgery. Since few colonies or worlds accept convicted criminals as prospective immigrants, most convicts accept psychosurgery.

In addition to their duties as law enforcement officers, IEF agents also function as emergency service workers. IEF stations are positioned so that they and their cybershell assistants can reach anyplace in either cylinder within 10 minutes. IEF agents respond immediately to violent crimes, medical emergencies, fires, and any action that threatens the integrity of the habitat. Because of the threat of terrorism, all on-duty IEF agents are armed with police armguns. Whenever anyone threatens or appears to threaten the integrity of either cylinder, IEF agents shoot first and ask questions later. While they attempt to use electrolasers to take the individuals alive, if doing so proves difficult, they use their specially made micro-missiles. These missiles explode into polymer shrapnel that is exceedingly deadly, but is incapable of injuring the cylinder walls. Currently, IEF agents have only had to kill four individuals, and while they are not eager to kill more, the safety of the habitat always comes first.

Extreme Games & Dueling

While the IEF exists to protect public safety, private safety is something that is far more

negotiable on Islandia. The advances in medical technology in the 2nd half of the 21st century mean that almost any injury is now completely repairable, and as long prompt medical attention is provided, individuals can survive almost any accident that does not instantly kill them. For all but the poorest members of the least advanced societies, fear of permanent injury from physical activities like sports, even dangerous sports is nearly nonexistent.

However, the laws found in most Fifth Wave nations still prohibit televising and gambling on sporting events with a significant risk of death, even if the participants can later be revived. Also, in almost all civilized nations unarmed dueling with lethal weapons, russian roulette, and single combat with dangerous animals like sharks are completely illegal, regardless of whether the televising or gambling is involved.

Islandia's status as a free city removes it from the influence of all such laws and has allowed it to become a haven for such sports. Here, brave or foolish individuals, armed only with a rebreather and a knife enter large tanks with a cloned great white sharks, while others play russian roulette or hold duels with handguns and razor sharp swords. In all cases, the individuals involved are not forced into these actions. Instead, some attempt these feats because of the \$10,000-\$30,000 they will earn if they allow the event to be televised and agree to permit slink recordings to be made. However, for most participants the money is a secondary reward - they attempt such feats either to prove themselves, or to engage in the ultimate competition against a rival.

In all cases, the participants are fitted with special biomonitors that instantly register when they fall unconscious. When this happens, the team of highly trained physicians, cyberdocs and emergency personnel moves in and attempts to save the life of everyone involved. The high quality of this medical care has meant that fewer than 3% of the individuals who participate in these sports die. In fact, almost a hundred highly skilled and utterly fearless people have participated in these sports more than a dozen times.

These modern-day gladiators pit themselves against death every few weeks or months and most have thousands or even hundreds of thousands of loyal fans throughout the solar system who eagerly await their hero's latest broadcast or slink recording. While many people living on Islandia consider these sports to be foolish or grotesque, almost everyone here knows the names of the most famous athletes (popularly known as *death junkies*). Also, most people living on Islandia have attended at least one such sporting event.

Within the past decade, dueling has become an increasingly popular pastime among the richest inhabitants of Islandia. Duels to the death are not permitted. Duels to first blood are the most common variety, and duels to unconsciousness are gaining in popularity. While less in demand than many other potentially deadly endeavors, duelists who duel to unconsciousness and allow slink recordings to be made often earn \$5,000 per duel, a fact that serves to make

dueling even more popular. Currently on Islandia, everyone willing to engage in potentially lethal duels wears a special bright red medallion, and a few dedicated duelists have had this symbol tattooed on their cheek or wrist.

Within this violent and unusual subculture, duels to first blood are quite common and are used to evaluate opponents, and as a method of "welcoming" new duelists into their ranks. Duels to unconsciousness are far more serious and are normally only undertaken because of some real or perceived slight, when two duelists are bitter rivals, or occasionally because two duelists wish to undertake the ultimate test of each other's prowess. One of the more unusual events of 2099 was when two prominent duelists, Letisha Jackson and Ingrid Narayan challenged each other to a unconsciousness duel before getting married. Both duelists survived, and the wedding was held the day Ingrid Narayan was released from the hospital.

Clades

Islandia is inhabited by a number of unusual clades. Because of the diverse nature of Islandia's population, it contains the single largest concentration of several post-human Clades, including Hives and Virts.

Hives

Hives are small groups of individuals who have been linked together by a primitive form of mechanical telepathy. Using a combination of two-way slink links and mutual puppet implants, the members of a hive are all in constant contact with one another. The members can constantly perceive the sensory impressions, emotions, and surface thoughts of all other members of the group. Due to the difficulty of processing such a huge volume of information, hives with more than a dozen members are almost unknown, and most of them have between three and six members. At any time, each individual within a hive can focus on the experiences of a single member, in either "surface" mode, where they perceive this data as coming from an outside source, or in "immersive" mode, where they experience that member's experiences as their own.

However, the distraction of constantly receiving everything experienced by all members of the hive is too great for any human mind. Through a combination of special software and experience, members of a hive normally choose to receive only the surface thoughts and emotions of the other members, not their actual sensory experiences. Hive members who are resting or not otherwise occupied normally shift into "surface" mode with one or more members, or "immersive" mode with a single member. However when otherwise occupied, hive members merely receive a constantly background of their fellows' thoughts, and emotions, combined with flashes of any particularly striking or vivid sensory impressions. Violent teens and street thugs sometimes enjoy that fact that when one member of a hive is

injured all of the other members also react.

Joining a hive is an incredibly intense experience, and most who try it are unprepared for both the sheer amount of data they will receive from the other members and for the intense and constant intimacy involved. A number of gangs, families and polyamorous networks try becoming a hive, but most have their implants deactivated within a few days or weeks. However, those people and groups who find that they actually prefer being a hive experience substantial changes in their self-identity and within a few months find being deprived of contact with other members of their hive both traumatic and devastating. In those few occasions where all but one hive member has died in an accident, the remaining member almost invariably joins another hive or commits suicide.

The members of most hives are also fitted with puppet implants so they can take control of each other's bodies. Each member can only be taken over if they wish it, but they can turn over control of their bodies anytime they want to. This is commonly done if one member of a hive is faced with a task that could be better performed by another member. In this fashion, the members of the hive can fly planes, perform first aid, or program computers for each other. The only limit on using these implants is that the members can be no more than 25,000 miles away. Further distances produce sufficient light-speed time lag that operating another's body is neither safe nor easy.

Being in a Hive normally determines a great deal about an individual's career choice and lifestyle. Most hives are in occupations where they can work together. Hives frequently become space ships crews, construction crews, IEF or search and rescue teams, research groups, programming teams, and some even run their own InVid studios. The Iris group on Islandia is a hive composed of six members who form an exclusive and highly paid private security company. In several cases, the members all work as artists, writers, or entertainers and share their work and their inspiration with each other.

Recently, a few hives have begun including SAIs, and several hives now incorporate Ghost or Shadow recording of deceased members. Also, while the practice is illegal in most Terran nations, several Islandian hives have had children who they fitted with a full set of hive implants shortly after they were born. Hives can be found throughout the Solar System, but are especially common on Islandia, because they rarely experience the prejudice that is frequently found elsewhere.

Hive Characters

Being in a hive member is an Advantage that costs either 36 or 76 points, depending on how much time the members spend with each other. Because they are constantly exposed to the distraction of experiencing the sensory impressions of others, hive members are only at -2

penalty to their rolls when receiving another member's sensory impressions in "surface" mode. When they are merely receiving emotions and surface thoughts from the other Hive members, they suffer no penalties.

Hive members also possess a number of unique Advantages and Disadvantages. Anyone who has voluntarily been in a hive for more than a few months will normally have all of these. All hive members have a Sense of Duty to the other members of their hive [-5] and a Duty to their other Hive members (6-) [-2]. In addition, if for any reason a hive member is cut off from communication with his hive, he will suffer from Chronic Depression (until reconnected - 35%) [-10] and be Indecisive (until reconnected -35%) [-6]. Also, hive member act in an odd and distracted manner than many people find disturbing, and so all suffer from the Odious Personal Habit (Distracted) [-10]. Also, many hive members increasingly find non-hive members somewhat confusing to deal with, since they cannot share those individuals' thoughts and experiences. As a result, most hive members also possess Low Empathy [-15] with everyone not in their hive. Hive members also all have at least 4 points in Sensie Skill.

The other hive members are bought as an Ally Group, normally containing between two and five people, who are 150 point characters, and are normally available on either a 12 or less [for a total of 80 points] or a 15 or less [for a total of 120 points]. Among the other obvious advantages, hive members can use their puppet implants to allow other members to perform difficult tasks for them. Also, hive members may ask others in their hive for advice. When making any Mental skill roll, characters may ask another member of the hive with a higher skill total for advice. This process normally takes between 10 and 30 seconds, but allows the character to receive a +2 on the skill roll (+1 if the character being consulted only has a skill level one point higher).

Virts

Inhabitants of the late 21st century are bombarded with increasingly greater amounts of information. Some individuals are unable to easily cope with this vast amount of data and have found unusual alternatives. While some retreat to low-tech enclaves and voluntarily cut themselves off from most facets of the human infosphere, others go in the opposite direction, and avoid all non-virtual interactions. Instead, they avoid meeting any other humans face to face, and perform all of their personal and business interactions virtually.

These individuals, known as Virts, can be found throughout the solar system, but as especially common on Islandia, because several wealthy and prominent local Virts have helped the residents overcome the prejudice many people feel for Virts. Also, Islandia is a prosperous and well-located colony that serves as an ideal location for Virts who wish to interact with Earth, Luna, and the other L-4 & L-5 colonies.

Many Virts are somewhat secretive about their true nature, especially since several popular InVids depict Virts as either dangerous sociopaths, criminal hackers, or most commonly, as pathetic and terrified losers. As a result, few people will openly admit that they are Virts. When met on-line there is no obvious way to determine if someone is a Virt, the only clue is that Virts tend to access the virtual world even more often than ordinary people.

An increasing number of Virts have been uploaded. Few uploaded Virts have themselves placed in Cybershells or Bioshells. Instead, most become Infomorphs who are permanently wired into the infosphere. However, all Virts are not interested in being uploaded. In addition to the obvious fact that being uploaded as a Ghost is a risky procedure that can leave the subject brain dead, most Virts are quite happy living in their physical bodies and have no desire to become pure information.

Virt Characters

Being a Virt is essentially merely possessing a series of disadvantages. All Virts have the Reclusive [-10] disadvantage, and most have either normal or severe Demophobia [-15 or -30]. Many also have the Shy disadvantage, but with the limit that they are only Shy in person [a -35% limit on this disadvantage], their on-line interactions are normal.

Visiting Islandia

Islandia is proud of its status as a free port, and the business council is determined to keep this colony the commercial center of L-4. Other than a quick and uninvasive check for weapons of mass destruction (a category that includes any weapon capable of penetrating the cylinder walls, poisons, radioactives, and any devourer, gremlin, or terminator nanotech swarms), and any surveillance technology, visitors are free to enter. Islandian customs prides itself on the fact that it literally checks for nothing except prohibited items. While, visitors may bring in any surveillance technology they can afford, all such items must be altered so that they respond to broadcasts by privacy transmitters. Once through customs, all visitors will be charged a fee based upon the stated length of their stay. This fee, which is currently \$20.00 per day, covers the use of the air, water, and other public facilities. Anyone who wishes to immigrate to Islandia need only pay \$10 per day, but they must pay the first full month in advance.

Islandia External Affairs

While fully independent of Earth, Islandia does maintain ties to the European Union and the United States. Islandia's largest commercial and ideological rival

is Luna City. Although it holds only half of Islandia's population, Luna City's continuing close ties to the E.U. and Japan means that it is and its allies have a large share of trade with these prosperous states. Many residents of Islandia consider everyone on Luna City to be overly nosy, somewhat backward preservationists. Islandia's closest ally in L-4 is The Shack, a small, but extremely wealthy Duncanite colony. Currently, the Tenjin parahumans of The Shack carry out most of the 0-g maintenance on Islandia, as well as performing much inter-colony transport for Islandia residents.

Some of the members of the Islandia business council also have a loose alliance with the Syndics of the Jumble, a struggling, criminal-run L-5 colony. Islandia residents who want illegal goods imported from Earth go to the Jumble, while those that wish orbitally made illegal goods purchase them from The Shack, or make deals with the Vacs of Clarke-1.

In addition to the rivalry with Luna City, relations with the Mormon colony of Deseret have recently become quite strained since a small group of ex-Mormon atheists on Islandia began transmitting anti-Mormon memetics to youths on Deseret. As a result, residents of Deseret are now forbidden from visiting or having commercial dealings with Islandia, an embargo that is serving to further worsen Deseret's already shaky financial position.

Clarke-1

"The Vacs on Clarke-1 continue to undercut our bids in both time and cost. Unadapted humans simply can't compete in orbital construction. Even the best space suits are clumsy and slow. For now, we need to expand our use of cybershells and adapted bioshells. Also, let's try to recruit some Vacs or Void-Dancers of our own. In the long-term, we need to find host families willing to raise some Vacs and foot the bill for raising the kids. Our schooling memetics are good enough that we should be able to successfully recruit over 70% of them. Current predictions indicate that without radical advances in space suit technology, within 20 years less than 10% of orbital construction will be performed by non-space adapted humans."

Jennifer Montoya, Vice President of Empire Aerospace Construction in a report to her fellow Vice Presidents

Clarke-1 Statistics

Subsystems Asteroid Hull, Solar Panels

P&P 270 Solar Panels, 3375 ksf

Armor (cDR)

Hull: 40

cPF

Hull: 10,000

Equipment

Modules: Old Command Bridge, Small Radar, Small PESA, 35 Housing, 17 Farm, 20 Factory, 5 Park, 10 Plaza, 10 large Entry Modules, 20 Surgeries, 1 3,000 Space Spacedock Hanger, 10 Labs, 10 Minifac Workshops

Statistics

Dim: 1,200' x 1,100' x 1,000' *Mass:* 43 million tons.

Volume: 875,000 internal spaces & 1 million rock spaces. *Price:* M\$ 483.

Population 2,980

Spaceport Class 3

Average Wealth Comfortable

Control Rating 2

History

In 2067, the German-owned firm Spitzbergen Vakuumfabrik purchased a small asteroid and had it towed into L-4 orbit. Basing their vacuum fabrication and zero-g manufacturing operations on the asteroid they named Das Luftschloss, they began producing a wide range of industrial products, including foamed metals, advanced ceramic composites, and ultra-pure industrial crystals. While the initial workers were all ordinary humans, in 2071, Spitzbergen commissioned Biotech Euphrates to create a line nano-assembled bioroids designed to be able to endure exposure to vacuum without protection. By 2076 the bioroids were fully trained. They took over the majority of the station's operations and by 2078 75% of the station's

personnel consisted of these artificial humans.

Unfortunately, Spitzbergen Vakuumfabrik had invested in several industrial processes that proved to be less efficient than improved procedures developed in the mid 2070s. As costs for foamed metals and various zero-g alloys continued to drop, the heads of the company attempted to cut costs. These measures resulted in significant quality control problems and in 2080 the company was investigated for the failure of several crucial components in a newly built European lift vehicle.

When the investigators visited Das Luftschloss, they were confronted with a factory run by more than a twelve hundred genetically engineered slaves. As the fortunes of the company had declined over the past few years, the bioroids' living conditions had been allowed to deteriorate and the rates of accidents, poorly treated injuries and even malnutrition had all greatly increased. Since Spitzbergen Vakuumfabrik first commissioned these bioroids, the pantropic rights movement had been steadily growing in the European Union. The initial reports of these bioroids was a major media event in Europe, and outrage over their treatment rapidly outstripped the initial purpose of the investigation.

The European government seized Das Luftschloss and immediately began investigating the alleged abuse of the bioroids. Over the next few months, Joseph Rosen became the star of this media circus. Rosen was a vacuum-adapted bioroid who had previously been the leader of a movement to organize the bioroids into a union. Although the bioroids were originally given simple alphanumeric designations, Rosen chose his name by combining the names of two modern Christian writers he admired, Joseph Ngoya and Elizabeth Rosen. Already the leader of a secret freedom movement, his passionate faith and intelligent eloquence made him the natural spokesperson for the Vacs. He became a media celebrity, and his hairless jet-black face was widely seen on EU media.

Rosen was upset with the EU's suggestions that they either help the Vacs adapt to life on Earth, or move them to a specially made facility. In January of 2081 Rosen declared that the bioroids were seizing Das Luftschloss as restitution for the wrongs done to them. Public support for Rosen continued to grow back on Earth, so the European Union agreed to his demands as donations to the newly freed bioroids began to pour in. Although the total ban on all bioroid creation took more than a decade, the events surrounding Clarke-1 is widely acknowledged to be the impetus for the passage of the European pantropic rights laws.

As the new owners of an aging factory, the bioroids elected Joseph Rosen president of the newly independent colony and renamed it Clarke-1, after Arthur C. Clarke, Rosen's favorite author. His suggestion that the colony be run collectively was adopted, and the residents began looking for work to improve both their home and themselves. Many bioroids became a low-cost construction workforce who helped build numerous colonies in both L-4 and L-5.

Several European-based pantropic-rights groups aided them in these endeavors.

Once freed, the colony thrived. Charitable donations allowed the Vacs to repair all of the worn and dangerous equipment on Clarke-1. Then, using moneys they earned performing orbital construction, they were able to upgrade and expand the facilities and purchased a number of biomodifications to improve their quality of life. By 2083 they had saved enough money to enable them to create a new generation of Vacs who are fully fertile and possessed a number of minor improvements on their original genotype. To avoid the stigma of being vat-grown, these newer Vacs were all created in artificial wombs. Although doing this was considerably more difficult and expensive than creating the original Vacs, the inhabitants of Clarke-1 did not want to continue the stigma of being assembled instead of born. Much of the expertise and almost 40% of the cost of creating these new parahumans came from donations by various European-based Pantropic rights groups.

Today, all inhabitants of Clarke-1 are vacuum-adapted bioroids and parahumans. Almost every member of the colony can survive in the vacuum of space with only a small air tank. In 2096 the first naturally-born vacuum-adapted children were born on Clarke-1. While both carrying a child to term is somewhat difficult for beings with such radical modifications, it is now clear that the Vacs are a fully self-sustaining subspecies. Currently, there have been more than 40 successful births on Clarke-1.

Recently, several dozen Void-Dancer parahumans have also moved to Clarke-1, however, the differences in biochemistry between the two different genotypes has meant that only Void-Dancers who have received immune-system boosting treatments can safely live on Clarke-1. While many Vacs have close relations with Void-Dancers, most communication between these two groups occurs on-line.

Inside Clarke-1

Government

Clarke-1 now has a population of almost 3,000 space-adapted citizens, who all belong to the Clarke Governmental Union. The CGU is a consensus-based direct democracy that is also a corporation that owns Clarke-1 and all its assets. Every citizen-shareholder has one vote and decisions are not final unless there is at least a 75% majority on any vote. In practice, the strong consensus-based ethic shared by most residents means that decisions are regarded as somewhat suspect unless at least 90% of the population agrees. Therefore, important issues can require several days of discussion, and both politics and voting are extremely common topics of conversation.

67% of all income earned by residents is paid directly to the CGU, to be used to improve

Clarke-1 and provide for the welfare of all of the inhabitants. On Clarke-1, food, housing, communication access, education, and medical care are freely available to all inhabitants. Most contracts between an external corporation or government and one or more residents of Clarke-1 are handled by the CGU, after the individuals involved have approved them. However, some of the residents of Clarke-1 regularly engage in smuggling and other profitable, non-violent illegal activities. Contracts for such work are always made solely between the individual residents and their employer, the CGU is never involved in these negotiations, to protect the colony from prosecution. Smugglers and other criminals are still expected to contribute two thirds of their earnings to the colony, and almost all do so.

The Economy

The Vacs are one of the most highly trained orbital construction forces in either L-4 or L-5. As such, they make the majority of their income building and repairing other colonies. However, many also earn money carrying packages and secure data stores in small, fast, stripped down ships. Since the Vacs require little radiation shielding and minimal life support, their courier ships can easily out-compete any competitors. They control most of the deliveries between the various Lagrange colonies and much of the small package delivery services between the Lagrange colonies and Luna. Not unexpectedly, some Vacs supplement their income through smuggling. Although, trade in weapons of mass destruction, fully-sapient AIs, or genetic material designed to produce uplifted animals or bioroids is considered to be totally immoral by almost every Vac, a number of them trade illegal software, pirated nanotech, and even Shadow copies of xoxnapped celebrities.

Religion

Religious faith was one of the primary factors that drove Joseph Rosen to help free the inhabitants of Clarke-1 from the control of Spitzbergen Vakuumfabrik. Using the limited, read-only media access the enslaved bioroids were given in their little free time, Joseph Rosen studied both religion and revolutionary politics. Joseph Rosen became a devout Christian Hyper-Evolutionist, although he never actually met or communicated with another member of this faith until after the colony was freed.

Between his own preaching, and visits by missionaries Rosen has invited, this faith has spread to more than half of the inhabitants of this asteroid. As a result of Rosen's impassioned early speeches, the Algernon Foundation and several Christian Hyper-Evolutionist groups became of the Vacs' first supporters. These same groups also supplied most of the genetic engineers that helped provide useful biomodifications for the older Vacs, as well as designing the template for the next generation of Vacs. However, the Vacs' unique lifestyle has produced some distinctive modifications to their faith. Following some of Joseph Rosen's early revelations, most Vacs believe that space is by its very nature sacred and that meditating in the

vacuum of space is a holy act that helps induce religious enlightenment. In their free time, many Vacs attach themselves to the colony by long tethers and experience the void of space for several hours at a time.

Life in Clarke-1

Clarke-1 is a typical beehive colony. The tunnels range between eight and thirty feet in diameter, and form a complex network of corridors and public spaces. Numerous small private rooms and sleeping areas are craved into the rock on the sides of these tunnels. Since all Vacs must still breathe, eat and drink, all of the colony, except for the vacuum manufacturing facilities has an earth-normal atmosphere. The colony's most unusual feature is that instead of the ubiquitous emergency rescue balls and space suit lockers placed in every airlock and large public space, there are many small hemispheres fitted with a dozen short flexible tubes. When someone grasps one of these tubes and inhales, the tube provides pure oxygen to allow the user to hold his breath longer and so better survive any emergency decompression.

Like most colonies designed and inhabited by people who have grown up in zero-g, there is no defined up or down. Most public areas are spheres or ovals, fitted with various fixtures on every available surface. A typical bar or restaurant consists of a spherical chamber between twelve and thirty feet in diameter that has a place to order food or beverage bulbs along one side of the sphere. Normally, the patrons float in the middle of the room, or hook their arms or legs around on of the many sets of handholds covering most of the walls. One of the most unusual features of Clarke-1 is also the most obvious; much of the outside of the asteroid is covered with telescopes, vacuum manufacturing equipment, and tether clips for Vacs to hook themselves to as they meditate in the endless void.

Clarke-1 is an exceptionally colorful colony, as are the Vacs who live there. As a reaction to growing up in a sterile factory, the older Vacs have now covered both the inside and outside of Clarke-1 with elaborately painted murals and similar forms of decoration. This habit has been picked up by the younger generation of Vacs and is now a permanent feature of Vac culture. Also, to offset the uniform jet black of their skins, and also to help make them more visible in space, most Vacs use elaborate, brightly colored body paint. Many Vacs paint themselves with abstract designs, but others cover their arms, heads, and torsos with reproductions of famous works of art or images taken from various cultures. Some Vacs also indulge in elaborate, brightly colored or self-luminous tattoos.

Clarke-1 Characters:

The following is a template for a typical young Vac. Such individuals make up almost 60% of the population of Clarke-1. Unlike earlier Vacs, these individuals were designed after the

colony had obtained its freedom, and the original Vac template was modified with the addition of various quality of life gene sequences, largely due to aid by the Algernon society. Older Vacs were identical, except that they were all Sterile [-3], lack the +1 IQ and as well as the Longevity [5] and Disease Resistant [5] Advantages, and possessed the Delicate Metabolism [-40] disadvantage, rather than the lesser version that all younger Vacs have. All Vacs are fitted with implant radios shortly after they are born. These radios permit them to communicate in space and help locate them in emergencies.

Vacs are quite striking in appearance, they are all tall and skinny and possess jet-black skin that is both very smooth and completely hairless. Their skin also feels unusually slick, much like plastic or the skin of a dolphin or other cetacean. While Vacs have long, slender arms and legs, they also possess somewhat enlarged rib cages. Individuals who are uncomfortable with parahumans have sometimes described them as looking somewhat like bloated black spiders. Some of the adaptations used on the Vacs were at the absolute cutting edge of the available biotechnology. As a result there were a few problems, the most serious being the fact that their metabolism is unusual enough (primarily due to the inclusion of significant numbers of cetacean genes) that ordinary drugs often work quite differently on Vacs and they require a special diet to remain healthy.

Avatar Vac-series 22 points (-21 points for older Vacs)

Attribute Modifiers: ST -3 [-20]; IQ +1 [10].

Advantages: Breath Control -1 [4]; Breath-Holding 6 [12]; Comfortable Wealth [10]; Disease-Resistant [5]; Early Maturation [5]; Free Fall +1 [4]; Longevity [5]; No Degeneration in Zero-G [3]; Prehensile Toes [7]; Radiation-Resistant [5]; 3D Spatial Sense [10]; Vacuum Adaptation [27].

Disadvantages: Acceleration Weakness [-5]; Delicate Metabolism [-20]; G-Intolerance (0.1 G increment) [-10]; Reduced Hit Points -1 [-5]; Skinny [-5]; Unusual Biochemistry [-5]; Unnatural Feature (jet-black, hairless dolphin-like skin) [-5]; Vow (give 67% of wealth to Clarke-1) [-10].

Features: Home gravity of 0 G. Increase height by up to one foot over the norm for the lowered ST, but weight is 50% of normal. Taboo Trait (Genetic Defects).

Availability: 2083 (early versions date to 2071). *Cost:* \$72,000.

{Joseph Rosen} (250 points)

Age 29; 6'6" tall. 110 lbs. He has no hair, green eyes and jet black skin. Rosen typically wears a loose, but high-quality sleeveless jumpsuit, and a small gold cross. Like many Vacs, he normally paints his scalp and arms with bright colored, vacuum-proof body paint.

ST 8 [+10]; **DX** 13 [+30]; **IQ** 14 [+45]; **HT** 12 [+20].

Basic Speed 6.25, Move 6.

Dodge 6, Parry 6.

Advantages: *Personal Advantages:* Charisma 2 [10]; Deep Sleeper [5]; High Pain Threshold [10]; Intuition [15]; Mathematical Ability [10]; Programmable Ally (-5 points, implanted) [3]; Reputation [20]; Status 3 [15]; Strong Will 1 [4]; Voice [10].

Biomods: Artery Cleaners [0]; DNA Repair [4], Immune Machines [5]; Respirocytes [14]; Spleen Augmentation [10].

Disadvantages: *Clade Disadvantages:* Old-style Vac [-21]. *Personal Disadvantages:* Disciplines of Faith [-5], Obsession (end slavery) [-5]; Sense of Duty (Bioroids) [-10].

Quirks: Congenial; Imaginative; Proud; Spends as much time as possible in Vacuum [-4].

Skills: Acrobatics-12 [2]; Area Knowledge (L-4)-14 [1]; Astrogation-15 [1]; Bard-17 [4]; Breath Control 14 [8]; Diplomacy-16 [4]; Electronics (Communications)-14 [1]; Electronics Operation (Communications)-13 [1]; First Aid-14 [1]; Engineer (vehicles)-13 [0.5]; Freefall-15 [8]; History-12 [1]; Knife-12 [0.5]; Mathematics-12 [0.5]; Mechanic (spacecraft)-12 [0.5]; Politics-16 [4]; Psychology-14 [4]; Savoir Faire-15 [0.5]; Theology-15 [6]; Vacc Suit-12 [0.5]; Writing-16 [6]

Language: German-14; English-14 [2]; Spanish-14 [2]; Chinese-13 [1].

Equipment: Like all Vacs, Rosen is fitted with an implant Radio. He also possesses a Virtual Interface Implant, fitted with a Complexity 4 computer and an implantable infomorph for an NSAI. He habitually carries an air mask, a hand thruster, and a bible. When making public appearances his security advisor usually convinces him to wear a suit of light nanoweave armor.

Joseph Rosen is the elected president of Clarke-1, he is also a hero to his fellow Vacs, and is exceedingly popular with them and with most pantropic rights activists. Rosen is a deeply religious Christian Hyper-Evolutionist who believes spending time in open space brings him closer to God. His faith and his experiences as a bioroid slave have shown him the evils of both slavery and the exploitation of bioroids. Today, he is both the leader of Clarke-1 and a passionate advocate for pantropic rights throughout the solar system.

Visiting Clarke-1

Clarke-1 is open to all visitors and welcomes pilgrims, potential clients and anyone else who wishes to visit. Visitors are given the same type of routine weapons and hazardous materials inspection as on Luna City. Currently, long-term immigration is only open to individuals capable of surviving in vacuum, but others may stay up to three months. Visitors unable to survive in vacuum are warned to keep their suit nearby at all times, since emergency suits and rescue balls are only located in the visitors sections and the hospital. Many Vacs view normal humans as extremely fragile and can be somewhat over-protective of non-vacuum adapted visitors.

Clarke-1 External Affairs

Naturally, Clarke-1 has close ties to the EU, and is nominally part of the EU. However, in practice it is a sovereign state under EU protection. Clarke-1 is also closely allied to both Luna City, and VisionQuest. A number of the more well known Vacs, including Rosen have expressed support for VisionQuest's efforts. Also, while there are no formal ties between Clarke-1 and Islandia, the fact that Islandia dominates L-4 trade, and its radical free-trade policy means that most of the commercial flights undertaken by Vac pilots have Islandia as one of the destinations. While Clarke-1's close ties to Luna City do pose a strain on relations with Islandia, most Vacs and many Islandia residents who require their services are willing to place business before ideology.

In contrast, relations between Clarke-1 and Duncanite-controlled colony called The Shack are somewhat tense. These two groups are rivals in the field of orbital construction and the radical differences between Vac and Duncanite ideology has served to greatly aggravate this rivalry. Joseph Rosen is both a preservationist and a strong opponent of the Duncantites' libertarian beliefs. Also relation between Clarke-1 and clients in the United States and China are also somewhat strained because of those two nations acceptance of bioshell servitude.

However, Clarke-1's most bitter enemies are the leaders of Fountain-1. That colony's large-

scale use of menial bioroids has produced a great deal of tension between Clarke-1 and Fountain-1 and Rosen has specifically forbidden all Vacs from having any commerce with that colony. Observers worry that if these tensions worsen, conditions could degenerate into open electronic warfare and sabotage between these two colonies. So far, the large amount of distance between these two colonies has served to reduce hostility. However, as Vacs take over an increasing amount of commerce between L-4 and L-5, they come into increasingly closer contact with the residents of Fountain-1.

Recently, Joseph Rosen has also been cultivating secret ties with a few infosocialist groups. Rosen is a political radical who agrees with many of the principles of info-socialism, although he despises both the general lack of freedom the mistreatment bioroids face in most TSA states. Currently, Rosen working most closely with the more moderate infosocialist groups in Mexico. These infosocialist connections are also one of the primary sources of illegal goods that the Vacs smuggle, as well as the typical destination for good smuggled in from Luna and the asteroid belt. Although, observers have noted a significant degree of commerce between Clarke-1 and several infosocialist colonies in L-5, all ties between Clark-1 and the infosocialist groups remain secret.

Clarke-1 Adventure Seed

Secrets

EU law enforcement officials have heard a rumor that someone is planning to transport the xoxnapped Shadow of popular singer Helen Mathenge from Luna City where she recently performed a benefit concert, to Islandia, where it will be copied and widely sold. Not only is this rumor true, but the couriers are a pair of Vacs and the buyers have close ties to a Mexican infosocialist group. The PCs are either hired to stop this transaction and capture the people responsible, or they accidentally uncover evidence of the plan.

The Vac couriers are peaceful, but are willing to pay for the PC's silence, and the infosocialist representatives are willing to use either money or violence to insure that the PCs don't talk. If the PCs succeed in capturing the Vacs or even of providing evidence of their involvement there will be a serious scandal surrounding Clarke-1's connections to these groups.

Margaret

"I just got back from Margaret. It's wonderful, you simply must go. It's just like the old-style

womyn's communes up there, but with a lot more money. The anti-patriarchal memetics workshop I took did me a world of good. Also, I'm pregnant now. Imagine, at my age, 75 and I'm going to be a mother again. This one is a modified clone, she's going to be better than I ever could be. She'll be stronger, tougher and more able to take care of herself than any man. Lot's of folks say this sort of thing doesn't matter anymore, but for all our alleged advances, the patriarchy is still firmly in place. I'm going to send her up to Margaret for schooling too. My other daughter still refuses to reverse those damn hermaphrodite mods she got despite my threats to cut her out of my will. I want this one to grow up to be a real woman."

Sachiko Tanaka, in an email to her friend Lisa Jawara.

Margaret

Subsystems Torus Hull, Solar Panels

P&P 1680 Solar Panels, 21,000 ksf

Armor (cDR)

Hull: 20

cPF

Hull: 100

Equipment

Modules: 1 Old Command Bridge, 1 Medium Radar, 1 Small PESA, 560 Housing, 400 Farm, 5 Robofac, 120 Park, 140 Plaza, 10 large Entry Modules, 50 Surgeries, 20 Cyberdocs, 3,000 Space Spacedock Hanger, 30 Labs, 30 Minifac Workshops

Statistics

Dim: 2 mile in diameter, 1850' wide torus *Mass:* 34.25 million tons.

Volume: 12.2 million internal spaces. *Price:* M\$ 19,240.

Population 51,400

Spaceport Class 3

Average Wealth Wealthy

Control Rating 3

History

In 2059 a consortium of US and European feminist organizations, working with several British and American Neopagan groups drew up a plan to create an all-female space station in L-4 orbit. This station, named Margaret, after early 20th century contraceptive pioneer Margaret Sanger, was originally conceived as a home for women seeking to live apart from men. Margaret was designed to support itself by offering workshops and vacations to wealthy women who wished to experience living in a women's only environment for a short period of time.

One of the major contributors to Margaret was the Dancing Crane Studios, the largest US company offering women's self-defense training. Founded in 2018, Dancing Crane is now a world leader in women's self-defense and martial arts training, and contributed more than 10% of Margaret's initial expenses. Dancing Crane's founder Sylvia Vigil is deeply committed to the principles of feminism, and continues to see the need for a place where women can get away from the pervasive institutions of the patriarchy. In 2066, Ms Vigil moved to Margaret, and opened the largest off-world martial arts studio. This studio offers conventional martial arts training, while also serving as the center for the development of new styles of 0-g and low gravity martial arts.

Having recruited some of the best and most well known female martial artists in the solar system, the Dancing Crane studio on Margaret soon became the single most famous institution there, and is now one of the colony's primary attractions. It's prestige was further enhanced when the Amethyst Games, the prestigious all-female sports and martial arts competition, were moved to Margaret in 2072. Every other year, almost a hundred million sports and martial arts fans throughout the solar system watch these games, and millions of young girls dream of making their country, planet, or colony's team and competing on Margaret.

Although it continues to derive much of its income from luxurious vacation packages, featuring everything from low gravity team sports to empowerment workshops designed using advanced memetic techniques, Margaret is now best known as the center for women's martial arts. Today, having an instructor trained on Margaret is a mark of prestige for any martial arts studio.

Inside Margaret

Population

Margaret is a large Stanford Torus 2 miles in diameter and 1,850 feet across. The main wheel has a land area of approximately 2.2 square miles. This colony currently houses a population of 47,000 residents. With a torus ceiling located 1,500 feet above the floor, Margaret has an open airy appearance, and a climate sunny similar to Greece or Southern California. This station possesses abundant park land and other amenities that give it the earthlike feel preferred by many of its older residents.

Unlike most torus stations, Margaret also has several large habitat pods located along the spokes connecting the center to the rim. These pods are placed so that some possess gravity equivalent to that on the moon, and others have a gravity equal to that on Mars. Also, the central sphere, which remains at 0-g conditions has extensive habitations. These habitat pods can hold up to 6,000 residents; 2,000 each at 0-g, lunar, and Martian gravity. Unlike the main level, these pods are networks of corridors similar to most Lunar cities. Currently, these pods have 4,400 residents, including a number of free bioroids. In addition to maintaining its commitment to provide housing for all women, including women born off Earth, these pods also serve as centers for low and 0-g manufacturing and as low gravity martial arts studios, where new styles of unarmed combat, suitable for use on other worlds are created.

Economy

As was stated above, much of Margaret's money and prestige comes from the central role it plays in women's martial arts. The money gained from both local and on-line classes, licensing fees for new martial arts techniques, and sales of licensed Dancing Crane products, combined with the viewing and advertising fees from the widely popular Amethyst Games makes up 41% of Margaret's yearly budget. Margaret also remains a popular destination for wealthy female tourists, and it also offers empowerment workshops and classes in shamanic techniques, meditations, and neo-pagan history and practice both on-line and on the colony.

In addition, because of their renown as expert martial artists, a number of the more accomplished students have become well-paid bodyguards for important corporate and political figures. In 2086, the Dancing Crane studio on Margaret has also begun offering specialized bodyguard training, and is rapidly becoming the most prestigious source for female bodyguards in the entire solar system.

The prestige of Margaret bodyguards was further increased in 2095, when Jenissa Crow, the bodyguard of Ahmed Falazi, head of the US-based company Fatima Biotechnology saved the life her employer and his companion when they were attacked by Blue Shadow terrorists. Ms Crow was severely injured when one gunman shot her, but she shot that gunman and then

broke the other's neck with a kick. Since the entire incident was caught on Mr. Falazi's VIG, footage of this attack was seen all over the solar system. Demand for Margaret-trained bodyguard has continued to increase since then. Today, many security companies, including the prestigious Trans-orbital Operations are eager to hire operatives trained on Margaret.

There are also numerous rumors that some of the bodyguards trained on Margaret also occasionally work as assassins and enforcers for various criminal organizations. Although no law enforcement officials can prove this fact, one Margaret-trained bodyguard named Irene Sutowo now works for a Thai-based Prasong-Lao crime syndicate. She has already completed five successful assassinations. However, other than a few corporate bodyguards who have been used to subtly intimidate the heads of rival companies, the vast majority of Margaret-trained bodyguards have no connection with illegal activities.

Another major source of income for Margaret is genetic engineering and other reproductive technologies. In addition to financing clinics on Earth where women can reproduce using artificial wombs, Margaret also maintains extensive genetic engineering labs. Women from nations where radical genetic alterations are illegal or difficult to obtain can come to Margaret to have female children designed to their specifications. The local genetic engineers will not create genotypes that are meant to be slaves, sex-toys, or any other purpose that fosters the subordination of women. They also include various features like Easy Childbirth [1], Immunity to Disease [10], Longevity [5], and Reproductive Control [2] in all templates they create. In addition to regularly creating children who can reproduce by parthenogenesis, as well as ones who are simply stronger, smarter, faster, or healthier, they are also willing to create less publicly acceptable children, and have designed a number of genotypes designed as fast, deadly warriors, sometimes equipped with innate weaponry like claws. Unlike the older combat bioroids, these genetic templates are designed without Disadvantages like Short Life Span and Self-Destruct. Also, if possible, all these genetic templates are designed so that they appear fully human. Geneticists on Margaret have only been performing the most radical of these procedure for the past 17 years, so the fact that thousands of women have come to Margaret to turn their daughters genetically enhanced warriors is still largely unknown.

Society

While Margaret is large, prosperous, and backed by several very wealthy individuals, it is also well on its way to becoming an anachronism. The people who founded Margaret were primarily ardent middle-aged and elderly feminists who grew up amidst the gender inequalities of the 20th and early 21st centuries. However, such inequalities have largely vanished in the vast majority of Fourth and Fifth Wave nations. Today, most younger women look at Margaret as an excellent place to receive martial arts training or high quality, no-questions, asked genetic engineering, but they regard its women-only policy as archaic and somewhat silly.

In addition, when Margaret was founded, changing gender was still a difficult lengthy, and expensive surgical process. Now, it is relatively inexpensive, quick, and relatively painless. Currently, more than 5% of the population of the Fifth Wave nations have changed gender as an experiment, and number continues to increase as body-sculpting procedures become easier and less expensive. Today, the very definition of male and female are far from certain, and the highest quality sex-changed procedures change the subject physically and chromosomally to the point that only a highly detailed medical exam can reveal their original physical gender.

These technologies have had a dramatic impact on the rules about visiting Margaret. To avoid excluding women with genetic anomalies, and to include people who wish to become women, anyone is free to come to Margaret if they can pass both a blood test that indicates they have the correct range of hormones, and pass a physical to determine that they possess female anatomy. The recent fad for exotic and hermaphroditic sexual characteristics has caused considerable controversy on Margaret. Currently, the rules are such that hermaphrodites and other exotic types are acceptable if their blood tests are within the acceptable range. Some of Margaret's older residents, worry that if present trends continue, terms like male and female may cease to have any real meaning.

Many of the younger residents and most visitors would happily eliminate the women only policy as an archaic reminder of a no longer relevant past. However, almost two thirds of Margaret's permanent residents are at least 60 years old and have not fully adapted to modern attitudes about gender. Today, few young women immigrate to Margaret, but older women continue to move there. Demographic predictions by the advisory AIs indicate that it is unlikely that the women's only rule will be revoked any time in the next decade.

Government

Based upon late 20th and early 21st century feminist theory, Margaret is governed by consensus, aided by advanced AI social modeling programs. Every permanent resident votes on all issues, based upon recommendations by the AIs. If anyone registers strong objections to the results of a vote, then the issue is discussed in various open forums until the disagreement is resolved. In practice, most highly controversial issues are resolved through compromise, while less critical issues tend to be resolved when the opponents grow tired of objecting. Since all forums for discussing these issues are open to all citizens, the few opponents of otherwise popular measures can face significant social pressure to remove their opposition.

Margaret is at the forefront of pantropic rights. The ownership of uplifted animals and fully sentient AIs are both illegal on Margaret. Dancing Crane Founder Sylvia Vigil has been experiencing health problems and has stated that she will have herself uploaded when medical science can no longer maintain her health and quality of life.

Margaret Characters

Hippolyta Series Parahuman 132 points

Attributes: ST +2 [20]; DX +1 [10]; IQ +1 [10]; HT +1 [10]. *Advantages:* Alertness 1 [5]; Attractive [5], Combat Reflexes [15]; Easy Childbirth [1]; Extended Lifespan 1 [5]; Fit [5]; High Pain Threshold [10]; Hyper-Reflexes [15]; Immunity to Disease [10]; Longevity [5]; Night Vision [10]; No Menses [1]; Rapid Healing [5]; Recovery [10]; Reproductive Control [2]; Sanitized Metabolism [5], Toughness [10].

Disadvantages: Careful [-1]; Gluttony [-5]; Increased Life Support [-10]; Light Sleeper [-5], Overconfident [-10]; Proud [-1]; Stubbornness [-5]. *Features:* No Appendix [0], Taboo Traits (Genetic Defects, Male).

Availability: 2079. *Cost:* \$182,000.

This complex and expensive genotype is the most popular and most successful of the various security and combat-oriented genotype available on Margaret. Based upon the Gilgamesh genotype, anyone of this genotype appears to be a normal Gilgamesh series parahuman unless they are subjected to detailed genetic testing. However, their heightened metabolism can sometimes give them away. Hippolyta series parahuman must eat twice as much as normal humans to maintain their health.

Hippolyta series parahumans are fast, strong, and extremely durable. They excel as intelligence operatives, law enforcement officers and security personnel. However, almost half of the customers are extremely wealthy women who simply wish their daughters to be strong, powerful, and able to defend themselves in all situations. There are currently around 12,000 Hippolyta series parahumans.

Visiting Margaret

All visitors must undergo moderately thorough searches and medical tests. In addition to determining if the individual is carrying any dangerous technology, these tests also establish if the visitor meets the current criteria for being considered a woman. While Margaret is technically part of the United States, the entire colony is legally classified as a private club. As a result, only women may actually enter the station. Men can come no further than a special chamber in the hub, where they can meet with residents in high-security meeting rooms. Any woman who agrees to abide by Margaret's laws can visit or immigrate here.

Margaret External Affairs

Since many of Margaret's residents are originally from the United States, most inhabitants are favorably inclined towards Islandia. The fact that Islandia contains a thriving neo-pagan sub-culture means that devout members of both groups regularly travel to the Wiccan colony of Ravenstar to hold large public solstice and equinox rituals. However, Margaret is largely neutral in the rivalry between Islandia and Luna City.

Despite the fact that approximately half of the company heads on the Duncanite colony called The Shack are female, most residents of Margaret consider that colony to be an example of the worst excesses of "the patriarchy". However, the fact that the two colonies have a strong commercial rivalry regarding genetic engineering is the primary reason for the mutual negative feelings.

Similarly, the residents of Margaret regard the Mormon colony of Deseret as an abomination, and there is a special organization on Margaret devoted to sending coded emails to young women on Deseret who express an interest in leaving that colony. Some of the most extreme residents of Deseret have made threats against both Margaret and Ravenstar, but so far these threats have proven to be empty.

The MacLarren Unity

"It was an odd place to grow up - a lot like a really large family, but all us kids were the same age. I think it's true that your clones understand you like no one else every can. Heck, even Eldest, I mean Hiroshi, knew that we'd all likely be at our most rebellious when we were between 13 and 15, and then would settle mostly down. It was damn hard to get away with everything, but you also knew that when you screwed up everyone would really understand. I remember the time when I was 13 and Hiroshi came to me about the warning he'd received from some Euro-cops about my unauthorized sphere access. He was mad at me, but he also told me about how the Japanese police gave his guardian a similar warning when he was 14. It's hard to be really mad at someone when you know deep down that you'd likely do the exact same thing in their place."

-Sasha MacLarren in an excerpt from his ebook *Living With 1,200 Brothers*

The MacLarren Unity

Subsystems Sphere Hull, Solar Panels

P&P 720 Solar Panels, 9,000 ksf

Armor (cDR)

Hull: 20

cPF

Hull: 100

Equipment

Modules: 1 New Command Bridge, 1 Medium Radar, 1 Small PESA, 100 Housing (Reconfigurable), 100 Farm, 2 Robofac, 25 Park, 25 Plaza (Reconfigurable), 10 large Entry Modules, 10 Surgeries, 20 Cyberdocs, 3,000 Space Spacedock Hanger, 20 Labs, 20 Minifac Workshops

Statistics

Dim:. 2,000' in diameter *Mass:* 7.5 million tons.

Volume: 2.6 million internal spaces. *Price:* M\$ 6,000.

Population 4,800

SpaceportClass 3

Average Wealth Wealthy

Control Rating 2 (4 for all visiting non MacLarren)

History

Hiroshi MacLarren was born in 2053, the child of billionaire industrialist Kiko MacLarren and her husband Colin Lewis-MacLarren. Using the most advanced genetic engineering of the time, Ms MacLarren was determined that her child would be the most genetically perfect human ever created. She hired the best technicians to create a modified genotype that would later form the basis for the Gilgamesh series upgrade. Although the new genotype had a few unusual problems, Hiroshi was an unusually brilliant child. His parents paid close attention to

his development and did their best to insure that he would live up to his full potential. Unfortunately, in 2065, when he was only 12, both his parents died when their private jet was destroyed by an engine malfunction. Deprived of his parents, MacLarren lost himself in his studies.

Taught by highly skilled private tutors, he excelled at school and had received the equivalent of both an MBA and a Ph.D. in computer science by the time he was 20. At this point, he ceased his schooling and took control of his vast fortune. Within two years he had nearly doubled the assets of MacLarren Consolidated through a combination of stock and currency speculation using market prediction software he designed. He now had funds sufficient to begin the construction of his greatest dream, a world composed only of himself.

After being raised by parents and tutors who constantly praised him and assured him that his was the best genotype money could buy, Hiroshi MacLarren was determined to preserve his genotype for all eternity and to create a space colony where he and his clones could live in narcissistic harmony. When he was 22, he purchased several thousand artificial wombs and created 2,500 clones. He then hired nurses and tutors to raise his huge legion of clones. Five years later, he commissioned the construction of a Bernal Sphere capable of holding up to 10,000 residents.

In 2082, when the clones were seven years old, the habitat was completed and Hiroshi MacLarren and his 2,500 clone-children moved in. Not wanting his younger siblings to be spoiled by further contact with inferior beings, MacLarren had the children raised by several hundred sub-sapient bioshells, with as much personal attention by himself as he could manage. With the exception of a few physicians and highly select visitors, the clones saw no one who was not genetically identical for the next decade. During this time, two additional generations of clones were created, one in 2084, and another in 2091. Each generation was half the size of the initial 2,500 and were raised by both their older siblings and the bioshells. By 2092, the first generation of clones were 17 years old, and while most were content with their current situation, a sizable minority wished to travel and see the rest of the solar system. A number had also fallen in love with individuals they had met on-line and wished to leave to meet them.

MacLarren had not anticipated this last desire. He had attempted to provide for all of his clone's needs. Being gay and having used advanced memetics in the clones' early environment to encourage homosexuality, he had not considered that his clones would ever need to look beyond each other. However, also he could not stand the idea of forcibly restraining his own siblings, so he permitted all clones over 15 clones to travel. He also allowed visitors to come to the station, in an effort to keep clones that merely wanted outside contact from leaving. Around a third of the older clones left, but most returned within 2 years. Only 10% of the initial batch of clones decided to take up permanent residence elsewhere.

Inside The MacLarren Unity

Living Conditions

MacLarren is one of the most luxurious colonies ever constructed. All public and private areas are nanotechnological marvels that can be restructured at a whim. In addition to advanced robofactories capable of creating the resident's every need, the colony also contains extensive laboratory space for the clones to pursue their private projects, as well as numerous state of the art computers, and many similar amenities. Physically, the colony's climate and extensive park land are designed to resemble the lush terrain of northern Japan that Hiroshi MacLarren remembered from his childhood.

Government

The colony is run by its founder, Hiroshi MacLarren. His role is somewhere between that of a benevolent despot and a loving parent. While his authority was rarely questioned in the colony's early days, currently he rules with the advice and consent of his "children". He submits all-important changes to a popular vote, and the clones can also vote independently to challenge any of his decisions. While MacLarren is not formally bound by any of these votes, he normally abides by them to insure harmony. Because MacLarren and all his clones are so similar, serious disagreement are rare. While the clones may not all agree on a given issue, they can almost always understand the opposing point of view. Lengthy debate usually produces a satisfactory compromise.

The Economy

More than one journalist has referred to The MacLarren Unity as "the smartest place in the solar system". Since every resident is a mathematical genius who has the backing of a multi-billionaire, money is little problem for this colony. Many clones work directly for MacLarren Consolidated, tracking investments, searching out new investment opportunities, or creating advanced software, either for company use or for sale.

However, while Hiroshi MacLarren is an expert at both computer programming and financial analysis, most of his clones have radically different interests. Some are musicians, others are mathematicians, actors, engineers, performance artists, lawyers, and authors. The colony's vast wealth and Hiroshi MacLarren's desire to indulge his clone-children's whims and passions means that none of the clones actually need to work. Every clone is supported by a sizable trust fund. However, all clones are expected to have one or more serious hobbies. Both Hiroshi MacLarren and their other siblings speak sternly to those few clones that wish to live as idle dilettantes. However, non-monetary hobbies like inventing complex mathematical games, or even doing literary analysis on old 20th century flat-vids are all perfectly acceptable

occupations, as long as the project is mentally stimulating and the individual has something interesting to show for their work.

Visiting the MacLarren Unity

Visiting MacLarren is always an exceedingly surreal experience. Everyone looks the same; they are all skinny, Eurasian men who are 5'9" tall. The only difference is that the Original MacLarren is 47, and the clones are all either 25, 16, or 9 (a new generation of clones is planned in 2101 to celebrate the new century. All of the residents are obsessively brilliant mathematical geniuses. However, they are also children, teens, or young adults and many are eager for contact with outsiders and experience with the wider world.

Most visitors come to take advantage of the collective genius of the inhabitants. While ordinary requests for data analysis, mathematical modeling, computer programming, or similar tasks can be handled on-line, some requests are so sensitive or secret that they are dealt with in person. Since most MacLarren clones rarely leave the colony, clients come to them. Occasionally, individuals come requesting aid on illegal endeavors. While few of the clones are willing to personally perform obviously illegal acts, some of them are willing to provide someone else with information that will aid them in their illicit endeavors. Spies and thieves often watch clients going to MacLarren, since almost everyone going there require help with a highly secret and potentially valuable project.

Character Templates:

All clones share the same basic template. However, many of them possess increased Attributes due to training and education. IQs of 14 or 15 are quite common. The MacLarren clones also often differ in their social and mental advantages and disadvantages, skills, and motivations. Unlike many of the less extreme genotypes, MacLarren clones possess a number of significant disadvantages. While improved technology has meant that some of these disadvantages could be corrected in the most recent clones, few MacLarren would be willing to tamper with their precious genotype. Also, many geneticists now agree that many features of the MacLarren genotype, including it's extremely high intelligence, is a fluke that cannot be duplicated without also including the entirety of the genotypes, including most of the Disadvantages. Hiroshi MacLarren has little desire to see clones of his raised by strangers, so he has forbidden outsiders from studying his genotype. Researchers are currently attempting to duplicate this genotype's advantages without most of the associated problems.

The Intolerance (all non-MacLarrens) [-10], Overconfident [-10], and Workaholic [-5] Disadvantages are common, but far from universal among the clones. While many MacLarren clones see themselves as the pinnacle of human evolution, some do take advantage of various temporary or permanent biomods. However, any clone who uses biomods that changes their

physical appearance will be shunned by most other clones, and will acquire a -3 Bad Reputation among the entire population of the MacLarren Unity. In general, only those clones who wish to cut themselves off from the rest of their family make significant changes in their appearance. Clones who truly wish to abandon their ties to their relatives also change their last name. Clones who cut themselves off from the rest of the colony forfeit the trust fund that Hiroshi MacLarren has set up for them, so their income is whatever they can earn on their own.

MacLarren Clone 88 points

Attribute Modifiers: ST 9 [-10], DX 12 [+20], IQ 13 [+30], HT 11 [+10].

Advantages: Attractive [5]; Disease-Resistant [5]; Eidetic Memory [30]; Extended Lifespan [5]; Lightning Calculator [5]; Longevity [5]; Mathematical Ability [10]; Rapid Healing [5]; Versatile [5]; Wealthy (trust fund) [20].

Disadvantages: Alcohol Intolerance [-1]; Attentive [-1]; Compulsive Behavior (counting things) [-5]; Cyber-Rejection [-10]; Insomniac [-10]; Low Pain Threshold [-10]; Unusual Biochemistry [-5]; Weakness (allergy to air borne pollen; Fatigue damage only, 1d/5 minutes) [-5]. @TEXT:*Features:* Taboo Traits (Genetic Defects)

Availability: 2075. *Cost:* Not legally available, illegally obtained genetic material would cost upwards of \$400,000.

{Hiroshi MacLarren} (350 points)

Age 47; 5'9" tall. 145 lbs.; Hiroshi MacLarren is an attractive Eurasian man with short black hair and piercing green eyes. He is normally dressed in the latest fashions.

ST 9 [-10]; **DX** 14 [+45]; **IQ** 15 [+60]; **HT** 11 [+10].

Basic Speed 6.25; Move 6.

Dodge 6, Parry 6.

Advantages: Attractive [5]; Disease-Resistant [5]; Eidetic Memory [30], Extended Lifespan [5], Filthy Rich [50]; Lightning Calculator [5]; Longevity [5]; Mathematical Ability [10]; Multimillionaire 3 [75]; Programmable Ally (wearable Complexity 6 SSAI Informorph, 70 points, available 15- [12]; Rapid

Healing [5]; Status 5 (3 free) [10]; Versatile [5].

Biomods: Artery Cleaners [0]; Carninophages [3]; Cell Repair [15]; DNA Repair [4]; Guardians [5]; Pore Cleaners [2].

Disadvantages: Alcohol Intolerance [-1]; Compulsive Behavior (counting things) [-5]; Cyber-Rejection [-10]; Insomniac [-10]; Low Pain Threshold [-10], Selfish [-5]; Sense of Duty (MacLarren Clones) [-10]; Unusual Biochemistry [-5]; Weakness (allergy to air borne pollen, Fatigue damage only, 1d/5 minutes) [-5].

Quirks: Attentive; Careful; Chauvinistic (MacLarren Clones); Dresses Very Extravagantly; Imaginative.

Skills: Accounting-18 [3]; Acting-16 [2]; Administration-17 [3]; Area Knowledge (Japan)-16 [1]; Area Knowledge (L-4)-16 [1]; Artificial Intelligence-17 [2]; Bard-16 [2]; Board Games-17 [2]; Computer Hacking-15 [1]; Computer Programming-18 [3]; Cooking-15 [0.5]; Detect Lies-16 [3]; Diagnosis-13 [0.5]; Diplomacy-17 [4]; Economics-18 [5]; Electronics (Computers)-16 [1]; Electronics Operation (Communications)-15 [1]; Electronics Operation (Security Systems)-14 [0.5]; First Aid-16 [1]; Freefall-12 [1]; Gambling-14 [0.5]; Guns-14 [0.5]; History-15 [2]; Linguistics-15 [4]; Literature-14 [1]; Mathematics-16 [1]; Memetics-15 [4]; Merchant-16 [2]; Politics-15 [2]; Psychology-16 [3]; Savoir Faire-17 [2]; Vacc Suit-14 [0.5]; Writing-15 [2].

Language: Japanese-15; Chinese-15 [1]; English-15 [1]; French-15 [1]; Chinese-15 [1].

Equipment: MacLarren is rarely seen without a wearable Virtual Interface that also contains a semi-sapient AI of his own design. This AI constantly monitors news and financial data and alerts him to anything of interest. He also frequently wears the latest designer clothing and a RTG powered, 4 hex color-changing swarmwear cloak, that includes Forensic, Paramedic, Stinger, and Surveillance hives. When traveling away from MacLarren his clothing is usually a set of light nanoweave armor that has been impeccably tailored.

Hiroshi MacLarren is the head of MacLarren Consolidated, and the leader of the MacLarren Unity colony. He is also one of the hundred richest people in the Solar System. While he only leaves his colony on special occasions (preferring to company of his clones to that of ordinary people), he virtually interacts with the rich, famous, and powerful of the solar system on a regular basis. Rumors

about his buying choices can make or break companies and his actions, comments, and thoughts are regular topics for discussion by journalists in all nations.

MacLarren Unity External Affairs

In keeping with the founder's skillful grasp of politics, the MacLarren Unity, and MacLarren Consolidated maintain a strict policy of political neutrality. This colony trades equally with Luna City, Islandia, radical Duncanites, and even the infosocialist L-5 colonies and the gangs running Sakahrov Station. Hiroshi MacLarren does draw the line at trading with dangerous fanatics like the leaders of Fountain-1, or avowed terrorists like Blue Shadow, but MacLarren avoids given any offense to these groups, he merely refuses to take contracts from them. A number of MacLarren clones have strong political views, but since they range from Green Duncanite, to radical preservationist, to mild infosocialism, the net effect mostly cancels out, especially since most members of the MacLarren family are almost as apolitical as their father.

Hiroshi MacLarren and those clones who assist him in the family business will usually refuse to take contracts they feel to be immoral, but will otherwise enter into contracts with almost any group or individual who is willing and able to pay. While Hiroshi MacLarren is still primarily motivated by a desire to maintain the family fortune, many of his younger assistants are equally interested in how challenging and entertaining the assignment is. Individuals with unusually interesting or difficult assignments even sometimes receive a discount on their bill.

MacLarren Unity Adventure Seed

One of the 16 year old MacLarren clones recently vanished while visiting Islandia, and Hiroshi MacLarren just received a message asking for one million dollars for his safe return. The PCs are contacted by Hiroshi MacLarren, and asked to find the missing teen. Alternately, one of the PCs over heard or otherwise accidentally receives a message from the teen, who is confused and seeking help.

Initially, the teen, named Ikko, had planned to run away and live with friends he had met online. They concocted a plan whereby his new friends would make it look like Ikko had been kidnapped, in order to extract money from Hiroshi MacLarren. Unfortunately, Ikko became unsure about wanting to really cut himself off from his family. His friends, including the young woman he ran away to be with, do not want him backing out, since they would lose the million dollar ransom. The fake kidnapping is now becoming increasingly real. While Hiroshi MacLarren is anxious to get the boy back, his security advisor has told him that sending anyone from MacLarren Consolidate to search for the boy could further endanger

him, and few of the other clones have the skills necessary to retrieve a kidnapping victim. The MacLarren's are all happy to let the PCs help. A few of the other teenage clones know Ikko was going to meet friends he had met on-line. His closest friend, Raymond MacLarren suspects that Ikko was planning to run away, but has so far been unwilling to tell anyone else in the family.

Die Sonnenspinnerin Sieben

A revolution takes place only when there is no other way out.

- Leon Trotsky,

The History of the Russian Revolution

Among the many glistening monuments to corporate grandeur and national pride gliding along in the L4 cluster, few stand out as much as die Sonnenspinnerin Sieben. Its great, shining sails announce its presence from thousands of klicks out; in fact, local pilots often use it as an informal navigational reference. Everyone on Earth with even the remotest interest in current affairs knows its once proud heritage.

At least, so they think.

History

Die Sonnenspinnerin Sieben began its storied existence as the brainchild and crowning accomplishment of Herr Worst Herzberg, chairman, chief executive, and majority shareholder of the Maxim-Herzberg LIC empire. As the grandson of the only surviving Maxim-Herzberg founder, Herr Herzberg made his mark early and prominently. His 2087 decision to pull the plug on the flawed ghost of his grandfather both salvaged the company and electrified the news channels. His vigorous, gambling forays into microflexible-materials construction for electromagnetic applications transformed Maxim-Herzberg from a simple industry leader to market maker in advanced weapons and rail-transit construction.

Other than his business, Herr Herzberg possessed only one outlet for his passions: solar yacht racing. His Sonnenspinnerin, or Sunspinner, series of racing yachts dominated this rarefied sporting circuit just as Maxim-Herzberg did its markets.

By 2088, Herr Herzberg had enjoyed his fill of navigating precise, elegant loops around the Earth. Jaded by his strings of victories, both in orbit and the marketplace, he retired his last yacht, die Sonnenspinnerin Sechs, and reached for something more.

That something became die Sonnenspinnerin Sieben, an orbital Maxim-Herzberg installation that would serve to define the state of the art - and not incidentally stand as a shrine to Herr Herzberg's unprecedented successes.

For the next nine years, Maxim-Herzberg spared no expense in

designing and building this edifice. Herr Herzberg personally supervised every aspect of construction down to a painstaking level of detail, his cybershells (see p. 00) scrambling about the immense installation constantly querying, commanding, and leading.

Like many admirals of industry, Herr Herzberg trusted his cybershells only as much as valued employees, preferring to review their work. His attention fragmented by digesting more than 1,000 of his own points of view - the majority of them on die Sonnenspinnerin Sieben - Herr Herzberg began to lose his laser focus on Maxim-Herzberg's dealings. Thai competitors discreetly copied the German company's leading technology, and Maxim-Herzberg failed to innovate enough to defend its decisive lead.

In the meantime, the first of the astronomical bills for die Sonnenspinnerin Sieben came due. Maxim-Herzberg paid the first wave by scavenging funds from core operations, thus impairing its ability to generate future profits to meet the further expenses of the orbital station. Sniffing out the first signs of a vicious spiral, Herr Herzberg at last turned his attention back to ground level, but even as his cybershells idled along the lengths and stretches of die Sonnenspinnerin Sieben, it was too late.

The 2088 projections of a 20% increase in market share just paying for die Sonnenspinnerin Sieben seemed like so much drug-addled dreaming in the 2094 reality of a 41% decline in share. The next wave of construction bills broke over Maxim-Herzberg like a tidal wave, drying up cash flow and operating capital. Herr Herzberg took his own life with a 17th century dueling pistol. The surviving directors of Maxim-Herzberg filed for bankruptcy protection, then watched helplessly as creditors dismembered the company and picked over its remaining assets.

The Maxim-Herzberg story ends here for the fleeting attentions of most of Earth's citizens. Those with an interest in corporate affairs will recall the 2097 purchase of die Sonnenspinnerin Sieben by one of the primary contractors in its construction, Materials Application Geosynchronous, Inc., in some sort of debt-exchange transaction for which the full details never fully emerged.

Someone, presumably MAG, financed the finishing touches on die Sonnenspinnerin Sieben's construction, and someone, presumably MAG, now inhabits this almost eerily grand monument to an extinguished pride.

Die Sonnenspinnerin Sieben Statistics

Die Sonnenspinnerin Sieben consists of a large, sedately rotating, spheroid hull with two elegant and *immense* solar-panel arrays

extending more than a mile from each pole.

These arrays dwarf the station proper, each vaguely resembling the spread sails of a clipper-ship mast in their cantilevered and tapering aesthetic excess. The arrays sweep away from the station's axis in a mild arc, giving the visual illusion that die Sonnenspinnerin Sieben is making way in a fresh ether breeze. Their highly reflective surfaces give the station a huge visual profile. Despite their unique form, the arrays can be stowed away as per standard solar panels, though it takes more than 24 hours to completely furl or unfurl these monstrosities. The arrays are spin-mounted, so that they do not rotate along with the station proper. They also mass and cost 10% more than standard panels.

The station proper features a fluted, pearly white surface, giving it a strange old-world ambiance. Two large spacedock hangars sit on the hull's equator. Each features separate, angled entry and exit ports, so as to minimize the difficulties for pilots, who must approach the station on its equatorial plane and in its direction of rotation, matching up vectors on the tangent of the vessel's course and station's circumference. Each hangar easily can hold a *Pegasus*-class transatmospheric.

It looks like it should hang not from its gauche sails, but rather from a trio of heavenly golden chains, swaying in the hand of the Cardinal of all Cardinals as he makes his way down the aisle of his own grand cathedral.

- Diego Sansuria, *Times* orbital-architecture critic

For larger vessels, the station mounts an external cradle on the spin-free mounting of its "northern" solar-panel array. The cradle can handle up to a 1,250-space vehicle, more than sufficient for most cargo and passenger vessels, but transferring large quantities of passengers or cargo between the cradled vessel and die Sonnenspinnerin Sieben proper can be difficult.

Though the station could maintain up to 1.1 G in comfortable rotation, its slow spin only imparts 0.81 G between the hull's "tropics," which places a spring in the step of residents from Earth without causing any noticeable orientation difficulties. Most of the living quarters are placed near the outer equatorial zone for this reason, with a small portion of them located axisward to provide Mars-normal and Luna-normal "colonies." The station could house up to 1,000 in spacious, long-term comfort, though Maxim-Herzberg never intended to assign so many employees within it. The extensive farms provide life support for up to the full

complement of 1,000. Through use of gene-mod seed stock, they could produce food for up to 2,000. No such surplus is currently produced, for two reasons: The farms are configured to also serve as ornamental gardens in lieu of a proper park on the station, and though gene-mod stock is used, much of it is inefficient, delicacy fare. For instance, die Sonnenspinnerin Sieben produces the finest olives found away from Earth's surface, and truffles of considerable quality.

While Herr Herzberg envisioned die Sonnenspinnerin Sieben as a heavenly showpiece, on paper Maxim-Herzberg intended for the station to pay its own way through orbital manufacturing. Along its axis runs a substantial robotic-factory complex, taking advantage of micro- and zero-gravity conditions to produce a variety of sophisticated wares.

The station also possesses a modest stationkeeping and emergency-avoidance capability. At each pole, just clear of the solar-panel anchors, sit two kerosene-oxygen chemical rockets. These rockets add function to the solar-panel arrays' form, as the arrays' graceful arc also can keep most of the panels clear of the reaction-mass exhaust for short intervals. Each rocket can move the station straight up or straight down the station's axis of rotation at a stately 0.007 G - this does not require the station to de-spin first, nor does the G-force threaten to damage the unfurled solar-panel arrays. Internal, shared tankage allows for 1 hour of burn time split between the two rockets. The rockets have never actually been used, since no station commander has ever been eager to put theory to the test with a quarter of a billion dollars' worth of solar panels on the line.

The panels provide all of die Sonnenspinnerin Sieben's power needs, with a substantial surplus. Batteries provide an emergency reserve of 1.4 hours at full power consumption, 22 hours with robofacs and active sensors idled, up to a month if the station is allowed to die in order to extend life expectancy for its human occupants. In this last-ditch scenario, the farms would be completely harvested then shut down, killing even the hardiest stocks within 24 hours. The batteries would then provide heat to the living quarters, which would depend on the station's vast air-filled volume and the harvested foodstuffs for makeshift life support.

Ideally, a command crew of three sentients monitors the station's functions at all times. Maintenance requires 575 man-hours per day - a crew of 72 if performed by humans. In practice, the modified and repurposed Herzberg cybershells (see p. 00) perform most of the routine maintenance, farm-tending, and factory work.

[Not fully coded yet so as to be easy to read.]

Subassemblies: Spheroid Hull (+11), Solar Panels
[Top, Und] (+19 each).

Powertrain: 600-MW, 7,500-ksf 125 new Solar Panel, 30 Battery, 10 Chemical Rocket.

Fuel: 3,300 Light Tank with kerosene-oxygen; see above for battery life.

Occupancy: 1,000. **Cargo:** 6,988.

Armor F RL B T U

Hull: 4/4 4/4 4/4 4/4 4/4

cPF F RL B T U

Hull: 5 5 5 5 5

Equipment

Modules: New Command Bridge, Large PESA, Large Radar, Planetary Survey, 10 Farm, 10 Housing, Park, reconfigurable Plaza, 5 Robofac, 10 Cyberdoc, Large Entry Module, 10 External Cradle, 20 Conference Room, 2 Spacedock Hangars, each 120'ù120'ù120', 10 Surgery.

Statistics

Dim: 330' radius *Payload:* 35,040 tons

LMass: 753,607 tons

Volume: 287,496 *Maint.:* 0.17 hrs

Price: M\$14,327

HT: 12 *Hull Points:* 817

sAccel: 0.007 G *RMC:* 3,300 *Burn*

End: 1 hr *Burn Points:* - *Delta-V:* 0.00007

Design Notes

Die Sonnenspinnerin Sieben has a carbon-composite smart hull and steel-alloy armor over its 1,360.25 ksf surface. Each solar-panel array is roughly 700' wide at its base, narrowing along its 7,000' length.

Inside die Sonnenspinnerin Sieben

The grand confines of die Sonnenspinnerin Sieben do, indeed, house Materials Application Geosynchronous, Inc., a corporate "colony" busily engaged in orbital construction with ventures into deeper space.

Inside, visitors will find a capitalistic money engine busily humming away among expensive but tasteful furnishings. The well-appointed docking-station "greeting rooms" lead to a maze of well-appointed corridors that lead to a maze of well-appointed offices. Space is delegated in surprisingly liberal amounts, but then MAG's employee-residents number fewer than those that Maxim-Herzberg intended to deploy, and Herr Herzberg had intended to be generous with them.

Visitors to die Sonnenspinnerin Sieben are fairly rare, and invitations beyond the equatorial reception and visitors quarters even

rarer, so the majority of those that do set foot on die Sonnenspinnerin Sieben will come away with little more than the above impression, of a competent and busy company hustling about in a luxury into which it happily fell.

That's exactly the impression that those behind MAG want to leave.

Behind the Facade

What no one - save just possibly the most elite intelligence agencies - realizes is that die Sonnenspinnerin Sieben and MAG serve as cover for the IAs, a radical organization with loose ties to the nanosocialist movement.

A rather assorted collection of socialists and humanists, the IAs are bound together by a deep distrust of the transhuman wave's underpinnings - and a willingness to go to great lengths to oppose them. For the moment, the IAs do not attempt to legitimize intellectual-property piracy - they simply engage in it wholeheartedly, sowing chaos and diverting profits where transhuman pioneers would attempt to monopolize technology's leading edge and further marginalize the mass of humanity. The IAs base a variety of confidence schemes, grand thefts, and borderline acts of technoterrorism out of die Sonnenspinnerin Sieben, shuttling agents to and from groundside on MAG's regular shuttle flights out of Quito.

The Birth of the IAs

When nanosocialism emerged among several developing nations (see *GURPS Transhuman Space*, p. 00), a variety of left-leaning groups and individuals among the Western wealthy nations took notice. Most of these lapsed infosocialists left the nanosocialist bandwagon even more quickly than they joined it, once the Transpacific Socialist Alliance's copyright piracy began to make inroads into their own economies, even more when the Pacific War began.

Others, holding their convictions closer to their heart, watched and waited, learning from the TSA's mistakes in both policy and implementation. Even as the TSA was still stirring up Chinese and Australian ire, these mostly Western leftists began making sporadic, limited forays of an extranational nature, ignoring any pretense of law in committing carefully selected acts of data piracy and copyright stripping.

These pioneer technoterrorists dubbed themselves the Intellectual Artistes, or IAs. They probably would have remained a motley assortment of

underground computer programmers and web reweavers had not several exceptional individuals began coalescing their Brownian antics into an organized movement (see *die Sonnenspinnerin Sieben Characters*, p. 00).

IA Principles

The organizational process began with a codification of the IA principles. Foremost among these is a belief in sapient rights. Most of the IAs recoil in horror at the use of bioshells and enslavement of bioroids. They often specifically target their "revolutionary" actions toward businesses that develop these technologies and governments that deploy them

.

A dog with a silver dish is still a dog.
- Dr. Hermann Fraks, IA philosopher

On a broader scale, the IAs have deep misgivings about some of the underpinnings of the transhumanist movement. Avowed egalitarians - "What excuse now exists for all persons not to be equal?" is one of their catchphrases - their homegrown Bytaki Theorem attacks the growing social inequities of the transhuman reality. The theorem states that, while socioeconomic inequities can be philosophically forgiven in transitory periods of change that improve living conditions for all, they cannot be forgiven in a society in which change is a constant. In short, if the lower classes never possess an opportunity to catch up, all they'll ever do is sink relatively lower in relation to the leading edge. While transhuman proponents point out that these lower classes live very well compared to the unwashed masses before them, the Bytaki Theorem argues that a marginalized life is a social crime, no matter how well fed.

Given their agenda of leveling the existing social forces, the IAs set out to develop a plan of attack. Their most favored such plan derives from their AntiSingularity Principle, in which IA theorists argue that the transhuman belief in a singularity beyond which change becomes too rapid for human forecast is completely erroneous. The principle argues that human advances have steadily substituted invention for discovery, and that eventually advances will depend almost completely upon the implementation of preconceived notions. How can advances that spring from human/transhuman invention possibly outstrip human/transhuman awareness, especially given that intelligence augmentation has so far allowed the human mind to keep pace with its own creations?

Nature has a finite number of secrets.
- Dr. Hermann Fraks, IA philosopher

Perceiving this as a blind spot in the transhuman philosophy, the IAs have taken to meme mining (see *GURPS Transhuman Space*, p. 00) with a vengeance. They hope to subvert the transhuman movement from within, by carefully sabotaging the thought constructs and perception models framing it. IA experts have become some of the leading memetic theorists of 2100, though they conduct and retain all of their research in utmost secrecy.

Such a grand agenda required a great deal of funding. The antics of the original IAs almost naturally evolved from simple technoterrorism to data piracy for profit. Once coupled with the early IA memetic research, these operations extended into confidence games and subterfuge of a more sophisticated nature. The IAs became politically motivated con artists, both funding and implementing their agenda behind the myriad false walls of an overly complex transhuman world.

Many of these operations were fronted by the commercial practices of Materials Application Geosynchronous, Inc., an orbital contractor owned by one of the IA principles. MAG's own finances began to falter at about the same time that the IA memetic research began to demand incredible investments in the most cutting-edge computing technology.

In typical fashion, the IAs developed a bold initiative that would take care of both problems in one stroke.

The Taking of die Sonnenspinnerin Sieben

As with the majority of IA regulars, Colleen MacIntosh held a day job - having climbed by 2087 into a leading executive position in the Maxim-Herzberg empire. Though many Maxim-Herzberg initiatives - including its weapons proliferation and use of offworld bioroid labor - ran counter to her sensibilities, and she regarded Herr Herzberg himself as only marginally sane, she held onto the job relentlessly. Her position provided a great deal of sensitive data invaluable to IA efforts.

Consulting with Dr. Hermann Fraks and other IA memetic engineers, MacIntosh proposed running a confidence scheme on Herr Herzberg on a scale far greater than anything the IAs previously had attempted. She then pulled it off almost singlehandedly.

Insinuating herself into Herr Herzberg's personal life, she fed his already formed but hazy notions for die Sonnenspinnerin Sieben, using some of the oldest persuasion techniques on record. Once Herr Herzberg decided to build the station, in her official capacity MacIntosh steered some minor MAG construction contracts to other Maxim-Herzberg executives for approval, in order to conceal her own role in the affair. These contracts received approval despite some unique and arcane language deep within them dealing with the possibility of a Maxim-Herzberg default. None of the reviewing executives took seriously the possibility of a Maxim-Herzberg default. Once the construction reached a point of no return, MacIntosh began feeding key proprietary technology to extranational Maxim-Herzberg competitors through several cutouts. As this espionage impacted the marketplace, she did her surreptitious best to delay Maxim-Herzberg awareness of its impending peril.

Her efforts proved enough. Maxim-Herzberg defaulted, and the provisions in the MAG contracts came into play. MAG became a primary creditor with special privileges in the ensuing dismemberment of the German giant, and through several sleights of hand ended up purchasing die Sonnenspinnerin Sieben for 0.43 cents on the dollar.

The one major setback in her coup was Herr Herzberg's suicide.

Despite her great distaste for much of what the magnate represented, MacIntosh had come to appreciate the finer points of his character. The IA operative fell into a heavy depression when she learned of the death, and the leading IA minds spent a great deal of time debating whether they had gone too far in the die Sonnenspinnerin Sieben operation.

In the meantime, they moved in and set up shop.

Life in die Sonnenspinnerin Sieben

Currently, die Sonnenspinnerin Sieben houses 430 MAG employees and 785 Herzberg cybershells (see p. 00). Of the former, 87 know of and actively participate in IA activities. The remaining 343 have no knowledge of the IA, believing they work for a perfectly legitimate construction company. (At least, the IAs hope so.)

Most of the MAG employees work in AI-assisted design of inventory to be produced by the station's robofac's. Most of this work tends to be custom parts for Earth-orbit construction, but MAG holds several contracts on Mars and two in the belt, and is installing the hard data network on a Jupiter orbital.

MAG also has a rather large-scale product in development, called "the Beltweaver" in informal discussions. The Beltweaver would be

leading-edge microbot technology that would deconstruct select asteroids into millions of miles of gossamer-thin cable connecting inhabited asteroids throughout the belt, to facilitate power and secure-data transmission. The logistical difficulties of creating a power grid encircling half of the solar system have, so far, proven more than MAG's engineers can overcome, but research continues. The IA memetic researchers hold a particular interest in what effect this would have in bundling the scattered asteroid communities into a social whole.

A small percentage of the MAG employees supervises station operations, including a command section of 15 that maintains an all-hours, three-person staff in the command center. All of these personnel are IAs. The cybershells conduct most of the menial labor - both in station operations and MAG enterprises.

MAG maintains a small groundside office in Quito, from which it transfers personnel to and from Earth, but a MAG employee can expect to spend 90% of his career in orbit or out in the system. Overall, the company employs 875, but most of these personnel are housed and working at client sites. In general, the outstation workers rarely spend more than turnaround periods at die Sonnenspinnerin Sieben, and the station personnel tend to spend most of their time at the station itself.

Visiting die Sonnenspinnerin Sieben

Most visitors to the station are MAG employees, but MAG has need to hire a variety of personnel: ex-military for security, a variety of researchers, engineers of all stripes. Just about any sort of adventurer could find himself considering an opportunity with the company.

A MAG employee will have access to most portions of the station, but those who aren't IA members will find themselves locked out of certain portions of the robofacs and cargo holds.

The station also hosts a small but steady stream of customer representatives; see p. 00. These are carefully monitored during their stays.

In the event of a hostile visit, the station ostensibly possesses no defenses. In reality, the IAs have a host of non-lethal measures prepared to resist an invasion, including a variety of targetable Devourer and Gremlin swarms (see *GURPS Transhuman Space*, p. 00) and sleep agents. These aren't meant to stop a hostile entry so much as to delay it long enough to allow time to eradicate all incriminating evidence.

Die Sonnenspinnerin Sieben Characters

Key IA personnel hold most of the leading positions in MAG, and thus in die Sonnenspinnerin Sieben. Some of them include:

Shane Anderson, MAG CEO and Chairman

Though the IAs run their affairs mostly by rough consensus among an executive panel, Anderson would have to be considered as the "first among equals." His company serves as the organization's base of operations, and his opinion weighs heavily on its chosen courses of action.

The scion of New York socialites, Anderson enjoyed the latest in genetic upgrades and the best education, but witnessing the radical economic polarization of the U.S. Eastern seaboard throughout his young life branded him with a deep disgust for transhumanist practice, if not all aspects of the philosophy.

Looking for an outlet in which to express his budding political dissatisfaction, Anderson stumbled across the early IAs. Given his outstanding personal charisma and leadership, he quickly coalesced this loose-knit group under his own banner. Even as he did so, much of the old IAs' roguish methods and mannerisms began to take root in Anderson himself. He developed a taste for the grand stroke and audacious planning. Upon his father's death, Anderson inherited a controlling percentage in MAG. He rapidly integrated his new wealth with IA operations, to the point where MAG and the IAs are now inextricably linked.

Anderson is a 31-year-old Ishtar upgrade with an excellent education and Multimillionaire wealth. He spends most of his time in New York City, but frequently shuttles to Quito and die Sonnenspinnerin Sieben. Even when not physically present on the station, his cybershell serves as his limited proxy. No one has yet explored all the capabilities of this fantastically expensive, custom creature. It is a bush robot (see ***GURPS Transhuman Space***, p. 00), undoubtedly equipped with a host of self-defense and escape-and-evasion capabilities; however, it probably does not possess many lethal features. Anderson is an avowed believer in the sanctity of life, and will condone killing only under the most extreme circumstances.

Dr. Hermann Fraks, MAG Chief Market Definition Officer

Dr. Fraks began his career in Munich, where many of his early theories met with skepticism and even ridicule. An avid infosocialist, he endorsed the early nanosoc movement until its tactics began to turn lethal. Though the Pacific War did not cost a huge number of lives, some of the strategic decisions displayed a callousness toward sentient rights that dismayed Dr. Fraks, who was already forming the Bytaki Theorem (see p. 00) on his perception of the Fifth Wave's refined exploitation of the lower socioeconomic classes, a category into which Dr. Fraks would place bioroids, uplifted animals, and higher-order AIs. In person, Dr. Fraks can barely hold a coherent conversation on bioshells, so deep are his nonreligious convictions. On paper, he can quite elegantly condemn the practice.

Several early IA leaders took an interest in the Bytaki Theorem and other Fraks papers in the 2090s, and discreetly established a dialogue with the controversial researcher. In doing so, they underestimated Dr. Fraks' exceptional ability in meme engineering; he rapidly determined who they were and what they were about, and just as rapidly offered to join their efforts. In short order, he became the leading mind behind the IA agenda. On record, he works for MAG as a sort of metamarketing executive, identifying long-range trends in customer demand and how MAG can best position itself to be the company selected to satisfy those needs. In reality, he spends the majority of his time on IA affairs.

Dr. Fraks is a genefixed man in his early 50s who, despite his genetic predisposition otherwise, manages to maintain a small paunch. He rarely employs cybershells or other alternate point-of-view technology, though he is quite familiar with the psychological implications of their usage. He has very high skills in Artificial Intelligence, Intelligence Analysis, Philosophy, and Psychology.

Colleen MacIntosh, MAG Vice President of Operations

After the collapse of Maxim-Herzberg, MacIntosh took a position with MAG, a company with which - most data miners would swear - she had no previous contact. She has suppressed her depression over Herzberg's death with a constant dosage of Nepenthe (see *GURPS Transhuman Space*, p. 00), which has restored her previous persona as an ubercompetent, crisp businesswoman. Thus empowered, she easily juggles her very real responsibilities as MAG's chief operations officer and her identical role in planning IA actions.

The self-diagnosed and -administered medication has had a potentially troubling side effect, however. Her Nepenthe-steered conclusion

that Herzberg's death was simply a cost of doing business has made her a bit callous about considering IA operations that would result in other fatalities. The other leading IA leaders have yet to recognize this. If left unobserved, her personality shift could lead the movement into a very damaging situation.

MacIntosh is an attractive woman in her early 40s, of a genetically updated stock that she refuses to identify. She has very high skill in Administration, and is competent in most aspects of commerce. MacIntosh spends almost all of her time on die Sonnenspinnerin Sieben, where she employs an army of datalinked robotic underlings to keep her apprised of just about everything that goes on.

Aynna P'clov, IA Disinformation Specialist

Aynna and the IAs crossed paths when a 2096 IA operation targeted a Uruguayan xoxnapping ring that owned Aynna and used her for security. Rather than neutralize the IA agents that she encountered, she used them as an opportunity to find a better life.

She feels she has done so in the IAs, and is a fiercely loyal member of the movement. The IAs have entrusted her as their primary agent in covering their tracks on the web. Aynna spends most of her time searching out clues as to the IA's existence, neutralizing them, sprinkling red herrings throughout the data network, and generally sowing the information-overflow chaos behind which the IAs hide. It was her decision to retain the IA acronym even though it became commonly used to mean "intelligence augmentation" - the more confusion, the better. Aynna feels confident that most of the IAs' victims think that they fell prey to some unidentified criminal ring.

Her cover identity is as a MAG security officer on die Sonnenspinnerin Sieben.

Aynna is a Felicia-series combat bioroid with fairly good combat skills, but even better Intelligence Analysis and Computer Operation. She has only a few years left in her life span. IA scientists already had been researching means of extending bioroid lifespans through a highly infectious nanovirus; those who know Aynna are working feverishly.

Technology

MAG is in the business of creating new technology. Beyond the Beltweaver (see p. 00), any of a number of mundane (from a game perspective) technologies will be in development or production at any time

on die Sonnenspinnerin Sieben. The station's inventory also includes the Herzberg cybershells:

Herzberg Cybershell 163 points

Attributes: ST 9 [-10]; DX 12 [20]; IQ 8 [-15]; HT 11 [10].

Advantages: Absolute Direction [5]; Alertness +1 [5]; Clinging [25]; Composed [5]; DR 10 [30]; Eidetic Memory 1 (No skill bonus, -66%) [10]; Enhanced Move (Running) 2 [20]; Flexibility [10]; Infravision [15]; Lightning Calculator [5]; Machine Body [32]; Mathematical Ability [10]; PD 2 (Machine -60%) [20]; Radio Speech [25]; Single-Minded [5]; Visualization [10].

Disadvantages: Clueless [-10]; Hidebound [-5]; Low Empathy [-15]; Monstrous [-25]; Reprogrammable Duty [-25]; Short Arms [-10]; Staid [-1].

Skills: Climbing-14 [8]; Engineer (Varies) or other station-operations skill-10 [8]; Savoir-Faire (Servant)-8 [1].

Features: Small computer (Cheap, high capacity, Complexity 6).

Availability: 2088. **Cost:** \$52,000. **Weight:** 70 lbs. **LC:** 5.

The Herzberg cybershells (see p. 00) consist of a multisegmented, serpentine cybershell resembling a thinner, more nimble Naga snakebot enhanced for zero-gravity operations. The cybershells can be found scurrying all over die Sonnenspinnerin Sieben, including the upper reaches of the solar-panel arrays.

Originally intended to host a ghost of Herr Herzberg himself, the cyberbots have been repurposed with a sub-sapient AI.

The cybershells can walk on any surface regardless of gravity conditions, and snake their way through openings as small as 8" across. Like the Naga, they can also transform into a robot arm by clamping one end of their body to an anchor and becoming rigid.

Adventure Seed: Herr Herzberg Reborn

In this scenario, Herr Herzberg has a ghost made before staging his suicide scene (see p. 00). Lying low for several years - perhaps hidden

away in a computer in die Sonnenspinnerin Sieben itself - the ghost has been harboring suspicions that someone led his hubris astray, and ferreting out clues as to their identity.

At last confident that he has identified his assailants (whether or not he has correctly unveiled the IAs, a man/machine of Herr Herzberg's nature is almost *always* confident of his conclusions), the ghost financier makes plans to seek his revenge and regain his fortunes. These plans will require him to recruit an eclectic assortment of agents.

Even if the ghost sends these agents after the wrong target, eventually the IAs will realize that Herzberg lives on - and will take drastic countermeasures, since they can't be sure what the ghost knows.

These measures probably won't include killing Herzberg or his agents - the IAs already have enough institutional guilt over the suicide - but these technoterrorists know plenty of dirty tricks, including public embarrassment, discrediting, and even false imprisonment.

Wiper Treatment

The IAs also develop new technology outside of MAG channels for their own purposes. The Wiper Treatment is a representative sample. It is an uncomfortable, 90-minute process in which microbots swarm across the subject's skin, removing dead cells, buttressing hair follicles, and scouring the fingerpads. Meanwhile, associated nanoviruses dilate the blood vessels in the eyes, strip down the genetically encoded contents of breath exhalations, and shut down the sweat and oil glands.

Once the subject endures the Wiper treatment, the microbots are removed, though the nanoviruses remain resident. For the next 24 hours, the subject won't leave genetic evidence of his presence unless he spits, procreates, takes a rest break, or bleeds. The first three are generally voluntary, and most IA agents hope to avoid the last one.

After the 24 hours expire, the treatment gives a -5 to any appropriate Forensics rolls to detect the subject's presence. The penalty improves by 1 every three hours afterward (to -4 from 27 to 30 hours after treatment, etc.) until it reaches 0.

The purpose of Wiper is to provide plausible deniability in case a live operation goes wrong. In an age of perfectly manipulable digital-imaging technology and cosmetic enhancements, courts generally refuse to accept a person's image alone as evidence of a crime. Judges and prosecutors greatly prefer forensic evidence that includes genetic content.

Conversely, they interpret lack of any such evidence as strong evidence that a real, live human being was not present, and that any visual evidence portrays a cybershell duplicate or is a digitally altered hoax. Therefore, an IA agent who has undergone Wiper can legally "hide in plain sight" as long as the investigating parties don't dig too deeply.

IA agents going out on live ops routinely undergo Wiper; however, they are taught to *never* rely upon it. It's a last-ditch measure that has only once come into play.

As far as they know, the IAs hold exclusive knowledge of this combination of microbot and nanovirus technology. The organization's continued refusal to release the technology to the public domain offends some of the more stridently infosocialist members.

Adventure Seed: The IAs Want You

The IAs basically consist of an eclectic set of adventurers with a common goal. As such, they might attempt to recruit any PC they encounter who expresses similar political leanings.

The IAs carefully compartmentalize recruits for a lengthy period, as they subtly double-check and test their loyalties. But, from the beginning, recruits will take part in operations - after all, that's what the IAs do, raid companies and governments to either steal funds or implement their social agenda. (Preferably, both at the same time.)

Anyone seeking to infiltrate the IAs should not have too much trouble getting in, but once they're in they'll have a hard time keeping their motives concealed. The IA psychological research is that good.

One potential problem is the IA distaste for lethal violence.

Any recruits who display a disregard for sentient life will find themselves in hot water - and shortly afterward could find themselves awakening on some South American dockside with absolutely no recollection of the past few months . . .

Other L-4 Colonies

Deseret

The Church of Later Days Saints founded Deseret in 2054. Along with Ravenstar, an all Wiccan colony, Deseret is one of the two oldest single religion colonies still in existence. Deseret is a Stanford Torus 2,000 feet wide and 1.5 miles in diameter. Designed to hold up to 40,000 people its current population is 32,000. Originally constructed as a refuge from and increasingly secular world, it was planned as the first of a series of all Mormon colonies, where the highest ranking members of this faith could live in joyous harmony. Unfortunately, the church was only able to afford one other colony, Brigham's Rest, which was destroyed by fractional violence in 2071.

Since that time, the church has given up on future space colonies and Deseret remains a monument to failed dreams. Today, almost 25% of children born on Deseret leave by the time they are 20 and most never return. Only the colony's high birth rate, and occasional immigration from Earth allows the colony to sustain its population. Polygamy is the norm on Deseret, and the colonists use medical techniques to insure that 70% of children born on Deseret are female. A council of elders rules Deseret, most of whom are well over 100 years old. Some of the middle-aged men have begun to resent the potentially endless rule of these elders, and have begun to petition for limits on the terms of council members. Economically, the colony is largely self-sufficient. The inhabitants earn additional money for the colony doing low-level programming and other forms of high-tech contract work. This income was initially supplemented by donations from the Earth-based church, but these mostly ended shortly after the destruction of Brigham's Rest.

Inside, Deseret is a typical old-style 1-g colony. The interior is landscaped to resemble a somewhat more verdant version the American southwest, and most residents live in individual houses and small apartment complexes. Large flat-screen displays cover most of the walls and roof of the torus. These screens display scenes from Earth, and occasionally images from Mormon mythology. Most visitors to Deseret are Mormons or potential converts, although declining revenues has forced the colony to also admit a limited number of virtual and in-person religious tourists. These tourists are interested in experiencing life as members of various faiths, but seldom convert. In-person tourists rarely stay in Deseret for more than a week.

The Shack

The Shack was the first of the Duncanite Tenjin colonies that was placed in either of the Lagrange points. It is a beehive colony built inside an asteroid almost two kilometers in

diameter. This asteroid was placed in Earth orbit in 2075. Initially created to provide a cheap source for various metals and space-made alloys, since then it has expanded into orbital construction, high tech manufacturing, genetic engineering, and cutting-edge AI research.

Like many Duncanite colonies, it is run on anarcho-communist principles. The minimal government exists only to enforce contracts and to provide mediation for contract disputes. Everything else is privately controlled. Its population of 27,000 people, most of whom are 0-g adapted Tenjin parahumans, make it one of the larger Duncanite colonies, and its profitable and diverse income base insures that it is also one of the wealthiest Duncanite colonies.

The Shack is divided into a number of separate departments, based on function. The largest departments are Trade Negotiation, Security & Protection, Transport, Life Support & Basic Systems, Genetic Engineering, Artificial Intelligence, and Construction. Each department consists of several competing companies. Companies that create products for outsiders earn money for the colony, and pay the other companies for all local services. In today's competitive orbital business environment, The Shack maintains a reputation for taking specialized, cutting-edge projects where they stretch existing technologies to the limit. While their services are relatively expensive, if someone is looking for the most advanced special-purpose AI, or a cutting edge genotype the Shack is where most of them go. Another of The Shack's commercial attractions is the fact that the various companies are happy to take small, highly specialized jobs, and to maintain a policy of absolute privacy. Once a project is complete, all records of it are destroyed, unless the client specifically requests otherwise. Although no one but the individual company representative knows the exact details, many companies have created numerous products for criminal syndicates and even terrorist groups. However, the vast majority of their work is perfectly legal.

Except for several casinos that offer extremely high stakes gambling, The Shack has little to offer visitors, except for the services of its various companies. However, these services guarantee a steady stream of visitors. All visitors are advised to pay for private security services before their arrival, otherwise they have no protection against pickpockets, robbers or other criminals. While The Shack is actually quite safe, some residents will not hesitate to take advantage of visitors not wearing badges indicating they are protected by one of the various independent companies in the Security department. The Shack gains additional money from visitors who pay for the privilege of not being followed by tiny aerostats that project a nearly unending series of virtual ads for various companies.

Like most Duncanite colonies, The Shack consists of a series of tunnels bored into the rocky asteroid. Most of the newer tunnels are between 30 and 100 feet in diameter, and are festooned with a vast array of company logos, small shops, dwelling units as well as real and virtual advertising posters. There are huge spherical 0-g plazas at the intersections of some of the largest corridors. These plazas are covered with a 3-D lattice of cables that allow the

L-5: The Junk Jungle

The chaotic settlement of L5 ("the junk jungle") was settled by a mix of idealistic visionaries and economic refugees from the rest of Earth-Lunar space.

Fountain-1

"We need to improve recruitment. The last two shipments of convicts have been subnormals only fit to become Class 3 or 4 Workers - if they get any worse we'll be able to do better with the damn bioroids. What we really need are more personnel with advanced skills, especially Class 1 & 2 techs and scientists.

I'm also recommending that we look into the ED's security training procedures. One Class 3 Protector severely beat a Class 2 Drone who accidentally wandered near a high security area, and another subjected a bioroid to severe verbal abuse. We need strong Protectors, but not ones who will harm or upset the menials. Unless ED can provide proof that such incidents will not be repeated, they'll need to lighten up on the Protector aggression induction. We need to keep the lesser castes happy to maintain productivity."

Class 2 Leader Virginia Ferguson, in her weekly status report

Fountain-1

Subsystems Asteroid Shell Hull, Solar Panels

P&P 440 Solar Panels, 5,500 ksf, also New Fusion Reactor, 55 Spaces

Armor (cDR)

Hull: 46

cPF

Hull: 10,000

Equipment

Modules: 1 Old Command Bridge, 1 Small Radar, 1 Small PESA, 100 Housing, 50 Farm, 20

Factory, 20 Park, 20 Plaza, 10 large Entry Modules, 20 Surgeries, 10 cyberdocs, 3,000 Space Spacedock Hanger, 25 Labs, 25 Minifac Workshops

Statistics

Dim:. 1,590' in diameter *Mass:* 85 million tons.

Volume: 2,100,000 million internal spaces & 2,000,000 rock spaces

Price: M\$ 874.

Population 8,200 (including 3,200 Bioroid drones)

SpaceportClass 3

Average Wealth Comfortable

Control Rating 5 (6 for visitors)

History

In 2067 Japanese writer Kiri Toshiro published a series of essay advocating what she described as the doctrine of Posthuman Fitness. She called upon all nations to begin rigorous mental and social tests of their populations. The citizens would then be assigned occupations that fitted their own particular talents. She also recommended that anyone who appeared to have untapped potential could be aided with a combination of memetic programming and neural enhancements. The PF movement, as it began to be called gradually gained in popularity in Japan, Australia, and the United States. In 2071 reporters tied Japanese PF movement to several ultra-right-wing militarist groups who were alleged to have close tied to the Yakuza. As popular support for PF collapsed in Japan, Ms Toshiro immigrated to Australia to work with PF groups there.

PF became increasingly associated with racist doctrines that proclaimed various groups to be innately superior to others, as well as a belief that it was the destiny of the superior races and genotypes to rule the inferior ones. Since many groups who supported PF also had severe prejudices against all forms of AIs, the superiority of organic life-forms over machines became an increasingly important part of PF doctrine.

In the United States, the PF movement only became popular among radically isolationist pro-Anglo groups that advocated severing all ties with Mexico and South America. As a result,

the PF has never become a serious political force in American politics. However, in Australia, the more radical members of several Japanese and Australian "racial rights" groups found common ground, and joined forces to make PF a powerful and well-funded political force. With clandestine support from PF supporters in both Japan and the United States, the PF-backed Australian Neohuman Nationalist Party (ANNP) won several local offices in Sydney and Perth, and by 2076 seemed poised to gain several national seats in the 2078 elections. However, revelations of involuntary neural modifications of troublesome members, combined with proof of close ties to groups believed to have been responsible for various terrorist activities caused popular support for the ANNP to collapse in 2077. However, most of the dedicated adherents remained loyal, and using the donations they received for the 2078 election, the ANNP purchased a small L-5 shell habitat that had previously been owned by a nearly bankrupt religious colony.

By 2080, 3,800 ANNP members, and allies from Japan and the United States had moved into the station they remained Fountain-1. Somewhat disenchanted with the PF movement her writings had spawned, Kiri Toshiro elected to remain on Earth, but her followers began to set up a community in line with her ideas. Fountain-1 continues to receive regular donations from fringe groups in Japan, Australia, and the United States, and until 2092, these contributions made up the majority of the station's income.

Inside Fountain-1

Government and Society

Fountain-1 is run according to the principles of PF. Every new resident is given an exhaustive series of mental, physical, and social tests. Then, the Employment Division decides what career or task-set the individual is most suited to. Then, most residents are subjected to memetic, and often nano-technological therapies to help them adapt to and excel as their new profession.

Every resident who is not part of the colony's leadership is given a series of memetic *treatments* to assure their loyalty to Fountain-1 and its rulers. In addition, most residents' minds are altered so that they are more able and willing to perform their chosen task. Such alterations can range from improved memory and mathematical ability for researchers to lowered intelligence and longer attention spans for individuals assigned to perform rote tasks.

One of the most terrifying facts about the residents of Fountain-1 is that almost everyone, from the ruling council to the lowliest repair technicians, is happy and content with their existence. The lowest status residents serenely perform mindless, routine tasks without complaint. Visitors have found that previously violent criminals are now peaceful and cooperative members of society. Of course, these individuals also exhibit fairly serious

personality changes. While a number of nations and colonies are interested in the rumored advances made by Fountain-1, many mental rights groups are horrified by the involuntary changes being inflicted on most residents, and Fountain-1 is regularly denounced by the European Union. Currently, several European pantropic-right groups are attempting to find individual willing to risk infiltrating Fountain-1, so that they can obtain proof of some of their practices.

Fountain-1 also makes extensive use of specially created bioroids. These creatures are typically barely sapient and form the lowest rung of Fountain-1 society. They are used instead of robots to perform the most menial tasks. Due to the leaders' distrust of sapient AIs, fully sapient AIs are illegal in Fountain-1 and semi-sapient AIs can only exist as informorphs. Bioshells are never used and cybershells may only be inhabited by non-sapient AIs. Fountain-1 and in fact all members of the PF movement are extreme carbon chauvinists. AIs are seen as potential rivals of humanity, and the creation of Ghosts is completely forbidden. Shadows are only created for purposes of psychological testing and interrogation and are destroyed after they are used. Under Fountain-1 law, no Shadow is allowed to exist more than 7 days.

Fountain-1 Characters

Mental Engineering

Every resident of Fountain-1 receives memetic treatments that gives them Sense of Duty (Fountain-1) [-10]. Individuals who prove resistant to these memetic techniques have memories of the attempt suppressed and are denied citizenship. Whenever someone is first subjected to this treatment they must make a Will Roll. Anyone with two or more levels of the Strong Will Advantage who succeeds at a normal will roll is unsuitable, as do other individuals who roll a Critical Success on their will roll.

Anyone who has been specially prepared for facing advanced memetic therapies can also resist this process on a successful Will Roll, and if they also make a successful Intelligence Roll, can convince the people administering the treatment that it actually worked successfully. The European pantropic-rights groups who are attempting to infiltrate Fountain-1 make certain that all of their infiltrators are provided with such treatments.

Once the individual's loyalty is assured, the Employment Division assigns them to a profession. Anyone with an Intelligence of 12+ will be assigned to a profession in research, memetic engineering, medicine, or some technical trade. A few exceptional individuals, who all have an Intelligence of 13+ will even be assigned to lower levels of the governing committee or to the secret covert operations division. The higher levels of government are all reserved for long-term residents who have proven their loyalty and reliability. Less intelligent

new citizens are assigned to less demanding tasks like routine maintenance, safety inspections, or various manual tasks, including acting as personal servants for the members of the governing committee. Memetic engineers on Fountain one can also reliably induce Fanaticism [-15] in subjects, and do so for every resident who will be working with sensitive material, or who will be called upon to periodically leave Fountain-1 as part of their work. However, the mid and high level members of the governing committee do not possess this Disadvantage. Researchers are also developing memetic techniques that will induce Extreme Fanaticism [-15], but have not yet succeeded.

Using recently created, and highly secret neuroviruses that were developed on Fountain-1, the Employment Divisions can give subjects any of the TL 9 Brain Modifications (Alertness 1-5, Ambidexterity, Autotrance, Eidetic Memory 1, Lightning Calculator, Mathematical Ability, and Single Minded) and Sleep State Modifications (Deep Sleeper and Less Sleep 1-5) described in GURPS BIO-TECH (pp. 32-33). In addition, they can raise IQ by +1 and lower it by up to -3. These viruses are a limited version of Neurovirus (GURPS BIO-TECH p. 79). This Neurovirus can also be used to create any of the Mental Disadvantages described on page 53 of GURPS BIO-TECH (Absent Mindedness, Attentive, Bad Temper, Berserk, Blood Lust, Bully, Callous, Cannot Learn, Chronic Depression, Combat Paralysis, Confused, Cowardice, Curious, Distractible, Dreamer, Dyslexia, Gluttony, Hidebound, Impulsiveness, Incurious, Indecisive, Laziness, Lecherousness, Low Empathy, Megalomania, Overconfidence, Paranoia, Selfless, Shyness, Slave Mentality, Split Personality, Stress Atavism, Stubbornness, Weak Will, and Workaholic). The Disadvantages Selfless [-10], and Workaholic [-5] are given to most maintenance technicians and other low level workers, and a few personal servants and bodyguards are given the Disadvantage Slave Mentality [-40].

The only limit on these changes is that the medical technician overseeing the process must make a Physician Roll at -2. On a successful roll, the process works, and the only side effect is that the subject is Confused for 100-HTx5 hours. On an ordinary failure the process works, but the subject gains a related Mental Disadvantage worth at least half the cost of the Advantages or IQ gain. For example, someone being given Eidetic Memory 1 [30] might also gain Flashbacks [-20], while someone given 3 levels of Less Sleep [9] might end up with the Light Sleeper [-5] Disadvantage. A critical failure by the Physician leaves the subject brain dead. Creating Disadvantages is easier, however, the subject still ends up brain dead on a critical failure. Also, after the process is complete, the subject must make an IQ roll at +3 to prevent their neural structure from rejecting these changes. If this IQ roll is failed, any Advantages are lost but all Disadvantages remain. While rejected changes can be repeated without penalty, there is a risk of brain damage and acquiring multiple disadvantages.

In 2098, bioengineers on Fountain-1 created the Cell Communion Nanovirus (GURPS BIO-TECH page 85). This procedure introduces special symbiotic viruses which infect every cell of the subject's body. Whenever two people with these symbiotes shake hands, kiss, or even

brush past each other, they can silently communicate both speech and images. This is the Secret Communication Advantage (Touch Only, -20% 16 points). This procedure is now used on all Fountain-1 covert operatives.

Bioroids

Bioroids are typically used instead of robots, both because they are less expensive and they are considered ideologically superior. All Bioroids on Fountain-1 possess the Disadvantages of Self-Destruct [-20], Selfless [-10], and Sense of Duty (Fountain -1) [-10]. Most also possess a number of highly specific Advantages to allow them excel at a single range of tasks. In addition, the majority of these bioroids are fully fertile and are bred like animals. All of their offspring possess the Early Maturation Advantage.

These bioroids form approximately 40% of Fountain-1's population and have allowed the colony to expand rapidly and to attain a high degree of industrial productivity. All bioroids are well-treated and given sufficient food, exercise, and entertainment to ensure that they function at the peak of efficiency. Harming a member of a lesser caste or even a bioroid is a serious crime. However, everyone who is not a member of the leader caste is a mind-programmed slave who only exists to serve the needs of the colony's leaders.

Economy

In addition to receiving contributions from various ideological groups, Fountain-1 has become known as a center for research in mental enhancement. In the intelligence community it is considered a useful source for highly trained free-lance spies and other covert operatives. However, it is most widely known as leading off-Earth source for advertising and other forms of directed memetics. Anyone who wishes to sell others on a new ideology, product, colony, or service knows that Fountain-1 is one of the best places to go to obtain a high quality, persuasive media campaign. While many groups refuse to deal with the ANNP, and the media technicians and memeticists on Fountain-1 will not produce campaigns for groups or products they have ideological objections to, Fountain-1 still contains some of the most desirable and prosperous memetic engineering firms in space.

Many residents of L-4 & L-5 associate Fountain-1 with the darker side of criminal justice. While most colonies either incarcerate criminals or repatriate them to their home nations, some colonies lack the facilities for the incarceration, or cannot convince the criminal's home nation to accept him. Those colonies that wish to dispose of violent criminals quickly and cheaply need only contact Fountain-1. Fountain-1 sends around small ships to transport violent offenders back to Fountain-1 for *retraining*, and even pays the colony a small fee for the use of their citizen. Such convicts become involuntary recruits to Fountain-1's PF evaluation and alteration.

Life in Fountain-1

Like most shell colonies, Fountain-1 consists of a series of concentric levels that rotate to maintain artificial gravity. Inside it looks and feels like most arcologies or any of the smaller Lunar cities. The ANNP specifically chose a shell colony because its thick walls made it highly defensible. Also, the founders added a fusion reactor as a back up for the highly vulnerable solar panels. Fountain-1 is designed to be able to withstand a prolonged siege.

Fountain-1 is exceptionally clean, orderly and regimented. Specially colored armbands are worn at all times to identify an individual's caste. Also, everyone in Fountain-1 possesses an implant radio, to allow the leaders to track the movements of every individual and to discretely and easily issue orders. Most inhabited portions of Fountain-1 are relatively simple, comfortable, and decorated with elaborate murals and other decorations designed to help reinforce the inhabitants' memetic programming.

However, in levels that are primarily inhabited and used by the leaders are quite luxurious. Imported carpets and tapestries line every surface, and most of the items they use in daily life are in beautifully handmade casings. A special caste of workers exists purely to create handmade artistic casings for personal electronics, hand forge and polish silverware, and otherwise provide the leaders with elaborate and beautiful items. These items are also occasionally sold to wealthy outsiders. Since most people at least suspect how these items are manufactured, the market is limited to people for whom aesthetics is more important than morality. All of the leaders also possess one or more personal servants. While the highest status individuals actually have human or parahuman servants, most members of the Leader caste use specially designed bioroid servants.

Visiting Fountain-1

Fountain-1 is an independent and rather paranoid state that is very careful about visitors. Everyone coming to Fountain-1 is subjected to extensive searches for weapons, surveillance technologies, or any other unusual technologies or medical anomalies. Fountain-1 has few visitors. Normally, only immigrants (80% of whom are convicted criminals), allies within the ANNP or similar groups, and people seeking to help with or gain access to Fountain-1's neurovirus techniques come to this station. Reporters, tourists, human rights activities, and the curious are not allowed to enter Fountain-1.

Visitors who have not previously received full PF evaluations or who do not wish to immigrate to Fountain-1 are restricted to public and residential sections

far from all essential services and Fountain-1's research facilities. To ensure that such visitors do not enter protected areas, they are all fitted with small transmitters that are locked around their wrists. These transmitters constantly broadcast the subject's position, and receive coded signals from the colony's main computer. If the wearer attempts to enter a restricted area, block the signal, or remove the band, alarms sound and the wearer is injected with drug that produces unconsciousness in 2xHT seconds. Anyone rendered unconscious in this fashion will awaken in custody, and can expect a thorough interrogation before they are released or executed.

External Affairs

The rulers of Fountain-1 have close ties with a number of anti-AI and authoritarian nationalist and racist groups throughout the solar system. They also contribute to and work with groups that are attempting to prevent or repeal bioroid rights laws. While no Earthly nation has close ties with Fountain-1, this colony is allied with extremist groups within the TSA and China, as well as their parent organizations inside the US, Australia, and Japan.

Fountain-1's chief opponents are the EU, and the L-4 colony Clarke-1. Clarke-1, Margaret, VisionQuest, and Luna City all have trade embargoes against Fountain-1. While many people on Islandia, the largest L-4 colony, oppose Fountain-1, Islandia's charter explicitly states that it is a free port, and is open to everyone. Since few people wish it known that they trade with Fountain-1, goods from Fountain-1 are normally first shipped from Fountain-1 to Islandia, and then discretely transferred to a vessel traveling to its final destination.

Its closest orbital allies in orbit are one of the gangs in Sakahrov Station, several of the Syndics in the Jumble, The Lynx Crew on Luna City, one of the security companies in The Shack, and the members of a growing political faction in Deseret that is interested in opening the council of elders to younger members.

In most cases, these alliances are based purely on convenience and mutual interest. The memetic and neurological techniques of Fountain-1 have a wide range exceedingly useful applications. Individuals and groups who wish to make use of these services must maintain ties to Fountain-1, since Fountain-1 is unwilling to provide services to anyone who openly objects to its ideals. The Fountain-1 security force is currently being increased due to rumors of possible violence or sabotage by small radical groups on Margaret and VisionQuest, as well as the increasing threat of spying by various pantropic rights groups.

Adventure Seeds on Fountain-1

nimble Tenjin to easily traverse these regions. The parahumans leap from one building to another, pausing briefly to grab or bounce off of a cable to redirect their motion.

Kepler Observatory

While many orbital observatories have moved further out into the Solar System, Kepler has remained in L-4 orbit since it was constructed in 2048. Today it is both one of the major participants in the search for extra-solar planets and a prestigious graduate university offering degrees in astronomy, astrophysics, astrobiology, and other similar programs.

Kepler consists of a small torus, 320 feet wide and a half mile in diameter. This colony houses up to 10,000 researchers, students, and visiting scientists. Nearby is the huge Bruno radio telescope and the long baseline optical telescope that consists of 6 separate thin-film mirrors, each of which is more than 1,000 feet in diameter, as well as a series of UV, infrared, and X-Ray telescopes. Kepler observatory is located on the edge of L-4 and is protected from electromagnetic pollution by a series of large opaque light shields that block sunlight and a large foamed stone shield that blocks all radio and microwaves from reaching the Bruno telescope.

Inside, the colony itself resembles many Earthly technical and scientific universities. Large attractive buildings are set amidst carefully maintained park land. The colony even has several small forested parks to allow weary researches and students an opportunity to get away from the stresses of work. Unlike many torus colonies built around the same time, the entire colony is not built on the inside of the outer wall. Instead, the 320 foot wide, 200 foot high interior of the torus is divided up into four separate levels. Each level has 40 foot ceilings, giving the colony an open airy appearance, while also maximizing the use of internal space.

Except for technicians, and other support personnel, almost everyone in the colony is associated with the university. However, Kepler Observatory does allow tourists. Most visitors take virtual tours of the station that are lead by students and some of the station's older SAIs. However, every year hundreds of people, mostly from other L-4 colonies physically visit Kepler Observatory. The observatory offers week-long classes for interested lay people, as well as lengthy and detailed tours of its facilities, and a chance for wealthier visitors to give a distant star a name of their choosing.

Infiltration

One or more characters with the appropriate skills is called upon to infiltrate Fountain-1. While many people wish to know what is really going on there, the most likely people to finance such expeditions are the Australian or Japanese government, who are both worried about what their political radicals are up to, pantropic rights groups from the European Union, who wish to document to severe abuses occurring there, and wealthy individuals who are willing to pay for information about and possibly the retrieval of someone who has been sent to Fountain-1.

The PCs' patron could fake convictions for them, allowing they enter as convicts, or if the PCs' have more time, they could infiltrate groups like the ANNP and attempt to gain entry to Fountain-1 as a highly-placed new members who will be exempt from the most invasive of the memetic programming and neurovirus treatments. In either case, the patron will provide the PC's with memetic and nanotechnological techniques for resisting the programming they will receive. Alternately, the PCs could enter as visitors (after being provided with appropriate credentials) and use concealed electronics to bypass the transmitters on their wrists. While a simple surveillance mission could potentially be accomplished fairly discretely, actually liberating someone will almost certainly involve considerable risk.

VisionQuest

"Welcome my children, now that you are safe and secure I will help you learn to actualize the pure animal essence within you. You are all beautiful, primal beings who have had to suppress your true nature by living among the smooth-skinned masses. Here we do not live by their rules. Their customs and morals are irrelevant to we who carry within us the blood and genes of other species within us. While you must all find your own way, I and my other children can help you learn what it is to be yourself and not a toy, a servant, or a mimic of the skins..."

Felicia Jones, from her introductory speech to new citizens of VisionQuest

VisionQuest

Subsystems Sphere Hull, Solar Panels

P&P 560 Solar Panels, 7,000 ksf

Armor (cDR)

Hull: 20

cPF

Hull: 100

Equipment

Modules: 1 Old Command Bridge, 1 Small Radar, 1 Small PESA, 100 Housing, 100 Farm, 10 Factory, 50 Park, 25 Plaza, 10 large Entry Modules, 10 Surgeries, 20 Cyberdocs, 3,000 Space Spacedock Hanger, 10 Labs, 10 Minifac Workshops

Statistics

Dim:. 2,150' in diameter *Mass:* 8.5 million tons.

Volume: 2.9 million internal spaces. *Price:* M\$ 3,600.

Population 8,500

SpaceportClass 2

Average Wealth Comfortable

Control Rating 1 (4 for all visitors without animal genes)

History

By the last quarter of the 21st century bioroids with obvious animal features, like fur, tails, or feathers were frequently used in various performance media ranging from entertainment InVids to nightclub singers and expensive prostitutes. In nations whose laws do not protect the rights of bioroids, these "animal people" are slaves and second-class citizens. Elsewhere, they are free, but often face substantial prejudice. The lot of uplifted animals is even worse, in most nations they are nothing more than property, regardless of the degree of sentience they display. In 2084, an animal-featured bioroid who used the stage name of Felicia Jones

went from being a moderately popular Canadian singer to a system wide sensation with her InVid performance collection titled "Open Season".

She was born in Korea in 2070, where she was grown as a pleasure slave. Pantropic right activists smuggled her into Canada when she was 10 years old. As a result, she was well aware of the hardships faced by many uplifted animals and bioroids with animal features. Even before she achieved system-wide fame, she worked for bioroid rights. However, once she was a famous celebrity she was finally able to lobby for a project she had long dreamed of. Ms Jones hoped to create a space colony where bioroids and uplifted animals could live in peace, far from the oppression and stares of normal humans. While even her tens of millions of dollars were unable to purchase such a colony, she was able to successfully lobby various pantropic rights groups, including a number of wealthy and influential organizations in Canada, Britain, and Germany.

In 2089 she retired from public performance, except for a few fund raising concerts, and devoted all of her efforts into making VisionQuest a reality. By 2092, her organization had acquired sufficient funds to build a small bernal sphere. This habitat was completed and residents began moving in by 2095. Today, VisionQuest has a population of 8,500 bioroids with animal features and uplifted animals, and room for almost half again that number to move there.

Inside VisionQuest

Government & Economy

Felicia Jones now lives in VisionQuest and is the absolute, if benevolent, ruler of her unusual kingdom. In practice, VisionQuest is essentially an enormous cult lead by Ms Jones. Knowing that her efforts saved them from slavery, oppression, or even vivisection, the vast majority of VisionQuest's inhabitants are incredibly loyal to Ms Jones, and most of them would gladly die to protect her. Ms Jones makes all decisions that affect the colony and resolves all serious disputes.

Everyone on VisionQuest has the right to petition Ms Jones to help them solve a problem. As a result, she spends several hours each day listening to complaints and problems from her "subjects". Jones runs the colony using a mixture of eccentric mysticism, alleged shamanic techniques Ms Jones found on the infosphere and more than a few elements derived from various fantasy novels and InVids.

She is also responsible for the colony's philosophy of communal anarchy. While all residents may keep any of their non-hazardous implants and small personal possessions, everything

else they bring with them becomes the communal property of VisionQuest, and is open for use by anyone who can demonstrate both need for and knowledge of how to use the item. All assets are also held in common, including Ms Jones small fortune. The colony is essentially self-sufficient and while everyone is expected to work for several hours each day, attending to the farms, or performing other necessary tasks, all of the basic necessities of life are free. Attending to Ms Jones' needs and acting as her personal servants is an extremely popular job that occupies more than 50 residents at any time.

For minor disputes that residents don't feel are worthy of Ms Jones attention, trial by combat is the most common solution if local mediators fail to resolve the dispute. Ms Jones believes that repressing "healthy aggression" leads to numerous physical and mental problems and is something that goes against the nature of individuals who are part animal. Actual combat trials are fairly rare but are important social events.

If only two individuals are involved, they fight. If many individuals are involved, then each side selects a champion and the participants fight until there is a clear winner or one side surrenders. While these combats have only resulted in a few fatalities, mild to moderate injuries are common. Fortunately, a team of trained medics are required to be on-hand and have the right to stop the combat if one of the participants seems to be in danger of his life.

The primary source for external funds for medicines, and other goods that cannot be produced on-site, is fund-raising. In return for every gift of \$1,000 or more individuals receive a hand made statue or other trinket made by the residents of VisionQuest. Many VisionQuest members who possess functional hands spend their required work time carving these statues. Gifts of \$50,000 or more entitles the giver to actually visit VisionQuest and spend a week living among the people he is helping. Among many European Pantropic rights activists, actually visiting VisionQuest is considered to be a form of pilgrimage. While a number of pantropic rights activists are critical of Jones' mysticism and the almost theocratic way she runs VisionQuest, the vast majority agree that without her VisionQuest would never have been built.

The other major source of income for VisionQuest comes from media rights. V-R tours of VisionQuest are somewhat popular, and combat trials between inhabitants have frequently attained moderately high ratings. While most residents refuse to have their fights recorded by slink, full sensory recordings of all of these fights are always made.

Visiting VisionQuest

Any parahumans or bioroids with obvious animal features and any uplifted animals can freely become citizens of VisionQuest. Humans who have given

themselves animal features like fur or scales can become citizens only if they can convince an interviewer that they have a sincere desire to experience life as one of the two-souled (as Ms Jones calls all parahumans and bioroids with animal genes). The vast majority of normal humans who seek to immigrate to VisionQuest are young adults from wealthy families who are seeking some cause or meaning for their lives.

Everyone who lacks animal features cannot visit VisionQuest for a longer than two weeks, and no more than 400 outsiders (or skins as they are called here) are allowed on VisionQuest at any time. All such visitors are given a thorough but polite search before they can enter the colony and are constantly accompanied by helpful, and friendly guides. Most residents do not mind the presence of "skins", but a few resent them, and almost a quarter of the residents actively seek to avoid contact with normal humans.

VisionQuest External Affairs

VisionQuest has close ties to various pantropic rights groups, especially those based in the EU. Since Felicia Jones has recorded numerous songs and performance pieces denouncing the oppression of bioroids and animal-featured parahumans in the United States and China, VisionQuest is poorly regarded by the authorities there, and the Chinese government has banned several of her performances.

VisionQuest has moderately close ties with both Luna City and Islandia. Felicia Jones suggested closer ties with Clarke-1, but while Joseph Rosen has been quite polite, he has also made it clear that he is highly dubious about Jones' religious and ideological views. Felicia Jones has traveled to Margaret several times and occasionally takes part in some of the neopagan gatherings held on Ravenstar. Sylvia Vigil of Margaret has donated almost three million dollars to VisionQuest and Dancing Crane Studios continues to hold benefits for VisionQuest and for bioroid rights.

Tensions between Fountain-1 and VisionQuest have continue to rise since the revelation four years ago that Fountain-1 makes extensive use of a number of different animal-related bioroids, including Tek Rats, Neo Gorillas, and Jagrilla Hounds (GURPS BIO-TECH pages 55, 105, and 102). Felicia Jones has denounced the policies of Fountain-1, and some of her more radical followers are currently planning raids against Fountain-1. Open warfare between these two colonies is a very real possibility in the near future. Felicia

Jones is aware of this possibility and is having some of her security personnel undergo additional training on Margaret.

VisionQuest Adventure Seed

The daughter of a wealthy European industrialist paid for bioengineered fur and surgery to give herself slitted eyes, claws, and other animal features. Then she moved to VisionQuest. Her parents found out where she has gone and want her back. The PCs are hired to go and retrieve her. Due to the laws of VisionQuest, the PCs are only allowed unlimited access to the colony if they gain animal features and temporarily immigrate. Otherwise, their guide will not allow them to communicate with the youth without her permission. Once on VisionQuest, they must persuade their quarry to leave willingly, since Ms Jones will not allow anyone to be forcibly removed from VisionQuest.

To make matters even more complicated, the daughter is now at the center of an argument between a small community of other wealthy youths who have voluntarily given themselves animal features, and a group of fully-sapient uplifted animals who consider these teens to be disgusting posers. As a result, the daughter has agreed to fight a duel with a large wolf-like uplifted dog. Knowing that their patron would be horrified to have her daughter fight a duel with a highly dangerous sapient, the PCs can either attempt to find another champion (which most likely involves one of the PCs fighting the duel), or try to settle the matter peacefully.

The Jumble

"If you're reading about The Jumble, you're not looking for luxury tours, you're looking for people to provide some discrete goods or services. Well, that's just what you'll get here. The accommodations are rough, the locals are a less than genteel, but when they make a contract they keep to it. The best part is their delivery services. Not only can you buy a rogue AI, a xoxnapped celebrity, or even some seriously scary hives, if you pay these folks enough they'll arrange for delivery anyplace on L-5, L-4, Luna or Earth. Some destinations cost more, but if they can't deliver they'll refund half your fee. Whether you're buying a stolen quantum computer, or a puppet implant for your annoying boss, these people deliver the goods."

Richard Navarro from *The Underground Guide to L-5*.

The Jumble

Subsystems Asteroid Shell Hull, Solar Panels

P&P 250 Solar Panels, 3,000 ksf

Armor (cDR)

Hull: 43

cPF

Hull: 10,000

Equipment

Modules: 1 Old Command Bridge, 1 Small Radar, 1 Small PESA, 50 Housing, 25 Farm, 15 Factory, 2 Park, 10 Plaza, 10 large Entry Modules, 5 Surgeries, 3,000 Space Spacedock Hanger, 5 Labs, 20 Minifac Workshops.

Statistics

Dim:. 1,280' in diameter *Mass:* 51 million tons.

Volume: 1,020,000 million internal spaces & 1,200,000 rock spaces

Price: M\$ 430.

Population 4,200

SpaceportClass 2

Average Wealth Average

Control Rating 3

History

In 2085 Quadros-Vargas Automatizacao, a newly formed Brazilian-based corporation began construction of their Vargas Astro-fabrica manufacturing facility, located in L-5. Q-VA

promised that this factory would create advanced cybershells and microbots using new techniques that would reduce costs by at least 12%. Since the station was located too far from Earth for telepresence work to be practical, that station's 7,000 workers would need to live and work on-site. Using a novel profit-sharing arrangement, workers were asked to contribute to Q-VA to buy shares in the corporation. Enticed by promises of high wages and spacious living accommodations, thousands of members of the lower middle class paid Q-VA more than \$10,000 to purchase the required number of shares. Unfortunately, in 2088, six months after the Vargas facility first opened, before all of the habitation areas were even completed, Q-VA's manufacturing technique was discovered to produce dangerously flawed products, and the investors declared bankruptcy.

Subsequent investigations revealed that several of the leading investors had used sophisticated false identities and had stolen the majority of the worker's money and used substandard materials to create their station. Since none of Q-VA's other creditors wanted to take possession of a poorly-built space station filled with flawed industrial machinery and destitute workers, Brazilian courts gave the workers sole possession of the station.

When Q-V A declared bankruptcy, the Vargas facility was inhabited by 3,700 people, many of whom had borrowed money to purchase their shares in Q-V A. Approximately 800 of these workers had the funds to return to Earth, or move to other colonies and start new lives. The remaining 2,900 individuals had nothing except their personal possessions, and part ownership of a poorly built station. The Vargas facility soon became known as the Jumble. Today it is one of the poorest and most run-down of the L-5 colonies. It continues to be inhabited only by those who are too poor to go elsewhere and by individuals who have managed to prosper in this harsh environment.

Inside the Jumble

Government and Economy

The Jumble is controlled by a variety of smuggler gangs. These gangs specialize in transporting illegal products to or from Earth and Luna. Many of these gangs are allied with or even branches of lunar or Earth-based criminal syndicates. While most of these gangs are small, violent and short-lived, a few are large and well organized. Other branches of these gangs can be found on a number of the poorer L-5 habitats, but the largest and most successful gangs live in the Jumble and effectively control this colony. A combination of bribery, threats, extortion, and the political clout of their earth-based allies have allowed the wealthiest of these groups to effectively become miniature local governments.

While many of the original inhabitants form the basis of these gangs, their number have also been supplemented by recruits from a number of the less successful L-5 colonies, as well as

exiles from other L-4 and L-5 colonies. Criminals and social deviants on Islandia who are eager to avoid psycho-surgery know that they will be accepted into the Jumble if they possess useful skills. Of course, even the Jumble has its own laws. While theft, minor violence and similar acts are largely unregulated, the various gang enforcers all agree that they will work together to hunt down murderers and anyone who threatens the safety of the Jumble. In the widespread L-5 jargon, attempting to vent some portion of a colony to space is known as *Holing*. In the Jumble, holing or performing any action that could threaten the integrity of the habitat is punishable by death.

In 2092, 17 people died when habitat module 39 was opened to space by sabotage from a rival gang. Only quick action by several brave inhabitants kept the several hundred residents of the adjoining habitat module safe. Since that time, all of the gang enforcers vigilantly hunt down killers and holers. While anyone is free to kill anyone they want elsewhere, even the most violent assassin is expected to avoid anything more serious than a fist fight while they are on The Jumble. Originally, murders, holers, and attempted holers were all spaced. Today, murders and attempted holders are sold to Fountain-1, a fate many regard as worse than death. However, everyone agrees that any future holers will still be spaced. Fortunately, no one has intentionally opened any portion of The Jumble into space since 2092.

Above all of the various somewhat chaotic gangs are the Syndics. This body of half a dozen people are the true rulers of the Jumble. Made up of the leaders of the colony's wealthiest and most powerful gangs, the Syndics have total control of all policies affecting the fate of the entire colony, as well as the ability to exile or kill any of the Jumble's inhabitants who are not protected by powerful allies.

The Jumble supports itself through a complex network of smuggling illegal goods and fencing stolen items. Unofficial law enforcement estimates indicate that The Jumble supplies almost 25% of the illegal goods and information used on Luna City, as well as most of the illegal items in the other L-5 colonies, and over 10% of the illegal goods on Islandia and the other L-4 colonies. Regardless of whether you want to buy stolen wearable computers, xoxnapped celebrity Shadows, illegally manufactured medicines and nanotechnology, illegal weapons, or simply copies of the latest V-R game, the Jumble can provide it.

Enjoying support from the most radical infosocialist groups in Mexico, several Brazilian worker's rights groups and certain corrupt sections of the Brazilian government, the Jumble also has numerous contacts with Earth-based criminal syndicates, primarily among those based in Central and South America and the United States. The Jumble narrowly balances its illegal activities with the protection it enjoys from its earth-based allies. While a number of nations have complained about the Jumble's activities, it remains Brazilian territory and no nation has been willing to challenge Brazil's authority. However, law enforcement officials in the United States and Japan are currently working together to prove that the leading gangs in

The Jumble regularly pay bribes to various Brazilian officials in return for their protection.

However, the primary protection enjoyed by the Jumble is the fact that the gangs there have so far refrained from dealing in the most dangerous and illegal items like radioactives, antimatter, and weapons of mass destruction. Although terrorist organizations and members of some of the more prominent Earth-based criminal syndicates have approached the leaders of several Jumble gangs with offers to sell them such items, all of these offer have been refused. While the opportunity for profit is extremely high, the Jumble Syndics have made it very clear that dealing in any substance that would bring too much attention to the Jumble is grounds deportation to Fountain-1.

Life in the Jumble

The Jumble is a typical small shell colony. However, the most obvious difference is that almost a third of the tunnels are devoid of any furnishings, since they were not completed before Q-V A went bankrupt. Also, most of the furnished areas are devoid of the decoration and other amenities found on most colonies, and many of the small items like light fixtures, hinges and similar components are broken, worn, or mildly faulty. While the Syndics works hard to make certain that nothing crucial fails, non-critical systems are up to the residents to repair, and few have the time or money to fix everything. As a result, while the dwelling of all but the poorest residents are normally in moderate repair, most public areas have numerous minor problems.

Visiting the Jumble

The Jumble is widely known to have some of the most lax customs procedures in space. Anyone carrying large, obvious weapons will be stopped by gang enforcers unless they can both give a good reason for needing the weapons and pay a substantial bribe (typically between \$500 and \$5,000). Other than that, visitors must merely talk briefly with the enforcer who greets them at the airlock, state their business (most people lie) and pay a entry fee based upon what the enforcer thinks he can get out of this person. Such fees normally range between \$50 and \$250. While the Syndics make certain that important visitors are unmolested, newcomers who do not already have allies or bodyguards risk having their pockets picked, and many are mugged. However, guides and bodyguards can be hired for a small fee. Such individuals wait around the port, and most gang leaders make certain that bodyguards who merely take clients off and rob them are kept to a minimum.

Jumble External Affairs

The Syndics who run the Jumble maintain ties to several South American, Mexican, and United States based criminal syndicates. In addition, this station is allied with the Lynx Crew on Luna City, several gangs on Sakahrov Station, a number of the companies on The Shack, and even have limited contact with the leaders of Fountain-1. Also, while The Jumble has no formal ties to Islandia's business council, a number of wealthy Islandia-based firms make use of their services, and are willing to insure that the business council does not attempt to limit trade with The Jumble.

Jumble Adventure Seed

The PCs need to acquire or recover some new piece of valuable or strategically important technology, like a new piece of highly effective hacking software. They suspect the item is somewhere in Earth orbit, the Moon, or the Lagrange colonies. Following a rumor, they go to the Jumble looking for it. While no one on the Jumble has it, when the PCs begin asking around, one of the less prosperous gang leaders senses an opportunity and offers to help them find it, for a price. The gang leader and several of her lieutenants will accompany the PCs and are willing to claim the PCs are part of their gang. However, the gang members will expect the PCs to take the lead in any dangerous interactions. This is a chance for the PCs to experience life in a criminal gang, while also working with unusual allies who could prove useful in later adventures.

Sakahrov Station

The smell always gets to you, even if you've been there before. It's damp, a station like that shouldn't be humid. Pink stuff leaks from the ventilators and oozes from between the wall plates. One night I woke up and the stuff was crawling across my floor. But the people here--it's like time travel--they'll give me my doctorate. If I can get them to talk to me.
Rebecca Swenson, Oxford meme scholar.

History of Sakahrov Station

Initial planning and construction of Sakahrov Station began in 2026; the last gasp of the Russian Federation Space Program. Israeli investments provided desperately needed hard currency for Russia's economy while the Israeli government hoped the Russian space program would give them control of the near space 'high ground'. Heavy lifters, antiquated even then, threw together a tin can in the uninhabited L5 point. As China raced into space, surpassing most other nations, Israel found more profitable areas for their investments and the Russian Federation collapsed into a dozen different micro-states and corporate enclaves. The Sakahrov Station program was abandoned.

However, there was already a permanent population on the station; a mixture of Israeli and Russian scientists, technicians and a population of construction workers hired from Eastern Europe. Some of these early inhabitants had lost not only their jobs, but also their countries. Rather than return to Earth, they took control of the station and declared themselves an independent colony.

Through the 30's and 40's, Sakahrov Station struggled for survival. The station had been designed for research, with a great deal of space given over to laboratories and astronomical equipment. It hadn't been designed for permanent habitation. At first the station sold research time and lab space, then they were forced to sell the equipment itself. In 2042, the station had a critical life support failure. Everyone on the station nearly asphyxiated before an ESA shuttle could reach them with equipment and aid. Prospects improved when the US got back into space, and Sakahrov Station was used as a transshipment point and their personnel hired for technical support.

Today, Sakahrov Station is neutral territory, where Martian Triads and major

corporations can meet without scrutiny or censure. Sakahrov technicians are also popular in the L5 area, where technology can lag 10 or more years behind Earth. They are located in the center of the L5 point, excellently positioned for shipping. Most major corporations active in the L5 area or Luna have at least a small office here.

Statistics

Old style tin can with two rotating habitat rings, 1500 inhabitants living in close quarters. Average income about 20,000/yr with residents of Lenin's tomb making half that. Complete statistics to be done when final draft of system is completed.

Technology of Sakahrov Station

Sakahrov Station has few modern amenities, there is limited sphere access, and few public tags and technology can lag a full TL behind the rest of Transhuman Space. Food is grown in vats, gravity is erratic, and slow atmosphere leaks are common. Everyone who lives on the station carries their own respirators--even the children.

Inside Sakahrov Station

Sakahrov Station is divided up into distinct districts, separated by gigantic safety doors. These districts range in size and influence from St. Petersburg with three ship docks, to Lenin's tomb, which is the dented remains of the temporary quarters, designed for the construction workers.

Most of the original inhabitants of the station are still alive, and the station is well into its third native born generation. All residents have a knock-off version of the calcium-hack, necessary in the low gravity of their home. The natives' long isolation in the L5 area has made them independent, insular and wary of outsiders. Their loyalties are to their own families, their districts and the station itself.

The Station has a unique, organic odor due to both severe overcrowding and the pink slime mold that grows in every damp corner of the station. Visitors are horrified by the occasionally mobile mass, but residents leave it

strictly alone. There are more than a dozen toxic fungus growing on Sakahrov Station, all mutating rapidly. The pink slime mold is harmless but aggressive enough to keep the other types at bay while more advanced methods of controlling the various infestations have failed.

St. Petersburg

This is the largest district on Sakahrov Station with three docks; it's the station's major point of contact with the outside world. Most of the district is a free port, where everything from pirated AI's to illegal genomes to stocks and bonds can be traded without concern for law or tariffs. St. Petersburg is a destination for many shuttles, free traders, Duncanite merchants and tourists from Earth looking for a bit of 'real-life' adventure.

St. Petersburg has invested in Fifth Wave infrastructure, with sphere connections and v-tags. They recently bought a street improvement program that applies virtual decorations and filters offensive views from connected headgear. The street designs are based on pre-Soviet images from the old Earth city of St. Petersburg. Of all the Sakahrov districts, St. Petersburg seems most civilized.

Corporations with interests in the L5 area usually have offices in St. Petersburg; sometimes nothing more than a remote station with a cybershell to handle business. Most governments also have some kind of monitoring station here as well--the closest the L5 area has to a diplomatic community.

St. Petersburg residents are rich, compared to the rest of Sakahrov Station, children here have advantageous genomes and educational opportunities. While the older generation remains conservative and wary of outsiders, their children are more cosmopolitan and many leave to live on Earth or other more civilized places.

Rebecca's Walk

This is the oldest organized district in Sakahrov Station, and proud of it. Rebecca's Walk is not large and has only one useful docking port. Like St. Petersburg, they encourage trade through minimal docking fees and favorable policies, but they are too small to support themselves that way.

People from Rebecca's Walk go off-station to make their living. They hire out as workers and technicians, specializing in the obsolete equipment common in the L5 area. Most of their customers are other poor colonies who are using antique equipment, abandoned asteroids, or refitted shuttlecraft from the turn of the last century.

Rebecca's Walk has preserved a fair amount of original lab and repair modules, which they use now as warehouses and maintenance facilities. Like all of Sakahrov Station, except for St. Petersburg, there is little in the way of modern comforts. There are relatively few v tags, and sphere access can be erratic.

Sabra

Sabra is an ambitious and growing district. They have two docking ports and have been aggressively pursuing outside investments. Sabra residents are also proud of the Israeli ancestry; here tourists and meme scholars can see remnants of nationalism almost forgotten on Earth. Customs and laws in Sabra are based on interpretations of the Torah.

Sabra residents can be found working in construction and technical fields, like their neighbors from Rebecca's Walk but they have also begun to make a name for themselves as advisors and guides for corporations and governments wishing to expand into the L5 area.

Section seven

Section seven was the original control module for Sakahrov Station containing key systems for life support, communication and power. The fusion generators for the station are housed in Section Seven. They are also the docking controllers for all of Sakahrov Station, guiding approaching ships into safe flight lanes and coordinating takeoffs and landings. This district is made up of the highly educated and pampered descendants of the original scientific staff; residents of Section seven are most likely to have prime genomes and off-station education.

The other districts on the station pay a communications fee to have Section Seven schedule ships to their docks. The fee is supposed to be set during the yearly Station-wide upkeep and policy meetings, but bribery is common. Approaching ships may also request a particular dock, or district, depending

on the business they wish to conduct. Special requests of this sort also cost, but it's the arriving ships that pay.

It would seem natural that Section Seven would dominate the rest of the station, but their district is in the central support column. They have no docking facilities of their own. Ultimately, their survival depends on the other districts and they can't afford to make enemies. Section seven is often the peacemaker for the rest of the station and struggles to preserve status quo in their overcrowded and decaying home.

Lenin's tomb

This is the ghetto of Sakahrov Station. The tomb was originally the temporarily quarters for the construction workers. When the station went independent, they were stranded. They have no docking facilities and little access to travelers. Few visitors even know the district exists.

Inhabitants here live in squalid and dangerous conditions. Their modules, made of cheap graphite-plastic alloys, are falling apart and they have little hope of escape. Their food vats and few garden plots are contaminated with toxic growths, along with their life support relays. The other districts, in the interests of mutual safety, have begun a policy of renovation in Lenin's tomb which, paradoxically, is resented by the people who live there.

People from Lenin's tomb make their way by taking the filthiest and most dangerous jobs both on station and off. If a fly-by-night nano-corp wants a cheap refit done on a mined out asteroid it's workers from Lenin's tomb that are hired. When the acid secreting fungus infesting the main life support module in Section Seven gets out of hand, residents from Lenin's tomb are called in to clean it out. These stationers have become experts in making do with duct tape, dysfunctional micro-technology, corrupted computer systems and technology so old most people have forgotten about it.

Lenin's tomb cannot afford even the most basic genomes for their children, or a decent education. The people here are almost all unmodified humans--except for unintended mutations and disfiguring illnesses and injuries. They speak a dialect so thick that even other Station inhabitants can barely understand them.

External Affairs

Sakahrov Station is the oldest L5 habitat. They remain strictly neutral in modern politics; having outlived their old enemies, they're not eager to make new ones. Other colonies in the Junk Jungle have a certain respect for Sakahrov Station's ability to survive and their years of experience living in the L5 point.

The Russian speaking natives of Sakahrov Station can be found all over the L5 area, and occasionally in more distant colonies, working as technicians, construction crew, or neutral negotiators.

Starburst Station

"Five seconds and counting."

"Give me control of the Station. You are defeated!" Ka'rg thundered.

Althasian troops had finally conquered Starburst station, the last refuge of the Free Stars League. His battle barge hovered above the forward viewers like a giant, carnivorous insect. Before him stood the Commander; in chains and helpless.

"Never!" The Eternal Commander's eyes glowed with pride, unconquered, facing the blue skinned alien without fear. It was as if the Electro-chains didn't exist.

"Four seconds and counting." The computer continued the destruct sequence oblivious to the struggle of wills.

"Surrender to me! Will you kill everyone that you love?"

The alien gestured with a wide hand to Lieutenant Bliss. She lifted her chin proudly, green hair dancing. "For nothing? If you die, your precious Free Stars League dies with you!"

"Three seconds and counting."

"No." The Commander met those cruel yellow eyes, quiet triumph in his voice.

"Freedom will never die. As long as people look up to the stars in hope, as

long as the memory of love and justice lives on in peoples' hearts, we will never die!"

"Two seconds and counting."

"But you--" The Eternal Commander sneered. "You are nothing without your blasters and your terror machines. When the suns on all the planets you have conquered rise again, you will be forgotten in the light of a new day!"

"One second and counting."

"Yeild!" The Althasian roared, dragging the Commander closer and wrapping massive blue hands around his neck. "I have won! I have defeated you! I have---!"

"Destruct sequence engaged and completed."

Last episode of Starburst Station, airdate 2067.

History of Starburst Station

The station in the Junk Jungle is only seven years old finished in 2093 but the spirit of Starburst Station is much older. The Starburst Station serials are familiar to anyone who grew up in the 2060's; the Free Star League, the Eternal Commander and his beloved Lieutenant Bliss and their battles with the Althasian Empire were a beloved but short lived entertainment series created in Thailand.

The inspiration of Starburst Station and its fight for freedom against terrible odds drew a following of dedicated--even fanatical--fans. These fans claimed the Starburst serials as their own, developing the Althasian language, creating their own underground Starburst serials and finally a group of fans choose to take the last step and bring Starburst Station to life.

Lauri Banyon, developer of the Althasian language and its seven dialects, as well as a major figure in AI linguistics put up the initial seed money. She drew together several other influential figures; Scott Jasper the developer of the Organic Construction System used to build Luna City and--most importantly--Tai Qui a little known investment broker from Hong Kong. Tai Qui turned the initial money donated by fans into the wealth needed to build an orbital station.

Thousands of fans offered money and skills to the station; a great deal of station construction done at cost or less, by architects, engineers or construction workers who donated their time and work. These people also ways to bring every aspect of the original series to life in their station. The shifting walls of the serials became chameleon skin; the various planets visited by the Eternal Commander and his field crew became specially designed gardens. There were compromises; the Starburst Station of the series was a shining 'collapsium' metal construct, the real station was to be built from a nickel-iron asteroid. Some aliens, originally nothing more than computer generated effects, remain beyond even the most advanced genomes or surgery. However, as far as the Starburst inhabitants are concerned, they have brought the heart and soul of the series to life in their station.

Starburst Station, in the L5 area, holds about 20,000 people dedicated to the ideals of freedom, hope, justice and courage revealed in the old series. The Station runs one of the major search and rescue teams in the area, often absorbing the costs of such rescues in the interests of preserving life. They also, due to the need to recreate the aliens from the old series, have excellent medical facilities and created a variety of imaginative cosmetic modifications for both people and animals. Tourism and new--but illegal--Starburst episodes are a major part of the station's economy. Tai Qui continues to be the financial heart of the Station; his investments consistently bring in the money needed to insure the survival of the station.

Yantari Philosophy

The Yantari Philosophy is mentioned only twice in the serials, as the explanation for Lieutenant Bliss' remarkable ability to be in the right place at the right time. Tai Qui is a follower--and the real world creator--of the Yantari Philosophy. He uses it to predict and master the world economy. This philosophy is spreading outside the Starburst Station, through Tai Qui's publications and the evident financial benefit it offers. Two Yantari schools have opened on Luna and advanced students apply to study with Tai Qui himself. Tai Qui claims that the financial rewards of the philosophy are an unimportant side effect and most Yantari Philosophers do

not suddenly become millionaires.

Starburst Station Statistics

Starburst Station holds 20,000 people with a slightly higher than average income. The station is an expanded asteroid, statistics to be generated when the system is complete.

Inside Starburst Station

From the outside, the station looks nothing like the original of the series but the inside is faithful to the sets and, most importantly, the imaginary culture of the Starburst serials. Slightly curved hallways open out into beautifully sculptured gardens--with peculiar 'alien' plants--welcoming homes, bustling but elegant workplaces and command modules where the command crew work to ensure the safety of the station and its inhabitants.

The internal walls of the station are chameleon skin, keyed to the v-tags everyone wears and they change color according to who's walking by. The station designers also integrated life support and emergency functions into the system, so inhabitants can monitor the safety of the station just by looking at the walls of their homes.

Command Staff

Stationwide decisions are made by consensus and democratic vote. In the interests of safety a command staff has been elected and has sworn to protect and the interests of the station and its inhabitants. Of the original investors, only Tai Qui is on the command staff. Laurie Banyan is the Ambassador from the Althasian Enclave and Scott Jasper died within a few months of the station's completion.

The command staff is made up of about a thousand people with various specialties including zero-gee architecture, diplomacy, law, and station engineering and, of course, advertising and marketing. Legal issues or

problems with tourists or visitors are brought to the command staff, who handles problems in accordance with the laws of the Free Stars League. The inhabitants of the station developed these laws themselves since the Free Stars League was originally nothing more than a gimmick in the original serials.

Some members from the command staff are working to develop a true community among the various colonies in the Junk Jungle. Meetings among the leaders from Sakahrov Station, VisionQuest and The Shack have been hosted by Starburst Station in hopes of creating some official, and peaceful, relationships among the independent colonies of the Junk Jungle.

The Eternal Commander

In the old serials, the leader of Starburst Station was the Eternal Commander, a man made immortal by wise aliens. When the station came on-line

the inhabitants chose their Eternal Commander from their ranks. Scott Jasper accepted the position and was surgically altered to look exactly like the Eternal Commander of the serials. In addition, the new Eternal Commander was

fitted with slinky uplinks, allowing his thoughts and experiences to be recorded for the next Eternal Commander. Scott died within six months of accepting the position and the Command staff chose his successor.

The Althasian Enclave

In the old serials, the Althasians were the archenemies of the Free Stars League and very popular among the fans. The languages, customs, religions--even music--of these aliens were invented from the scenes in the serials and modern medicine allowed dedicated fans to become the aliens they loved. Lauri Banyon was among the first to become Althasian and she brought about 500 others with her. Over the past seven years, the population of Althasians has grown to 900 or so, including a few genemod Althasian born children.

Althasians are large boned and tall, with slate blue skin, black hair and crimson eyes. Surgical and genetic modifications have given the transformed fans sensitive vision, sharp hearing, fast reflexes and a bad temper. Genetic engineering ensures that their changes will pass onto their children.

While the Althasians of the serials were enemies of the station, Lauri Banyon's group has quickly become one of the most visible parts of station life. The Enclave itself is an area of shadowed parks and sharp angled, dimly lit buildings, for the Althasians are a nocturnal people. Tourists make the Enclave a popular destination and humans look very out of place in the peculiar architecture of the supposedly non-human residents.

Life in Starburst Station

Starburst station is not like anywhere else. Aliens mingle freely with uplifted animals and normal looking humans. Young Althasians bluff and posture as they struggle to win their name--the primary goal for all of the fans transformed into the blue skinned, fierce looking aliens. Many fans have altered themselves to look like actors from the old series, there can be a half-dozen Lieutenant Bliss at a coffeehouse or bar, which can be very confusing.

The residents of Starburst Station are very well educated and often work, off and on station, in high paying scientific, medical or technology jobs. Tutors and professors work on Luna, teaching biology, genetics or cultural analysis. Althasians work in the search and rescue teams, or other dangerous tasks that might make their name for them. Yantari philosophers travel throughout the inner system, putting themselves in the middle of events in accordance with their beliefs.

Braxton Willis, a quiet diplomat formerly from the EU, was selected as the next Eternal Commander. Like his predecessor, he was altered to look like the original from the serials and fitted with slinks. He also downloaded Scott's slinky recordings, giving him the advantage of his predecessor's experiences.

Braxton Willis, the Eternal Commander. 250 pts.

ST 12, DX 14, IQ 15, HT 12

Alpha Upgrade (35), Intuition (15), Status (10), Wealth (10)

Reputation (10)

Duty (-5), Sense of Duty (-10), Shy (-5)

Free Fall (15), Judo (16), First Aid (15), Area Knowledge-Starburst Station (19), Psychology (17), Administration (15), Diplomacy (18), Leadership (15), Strategy (15), Detect Lies (17), Vac Suit (17)

Replay

Braxton Willis, the new Eternal Commander, has experienced Scott Jasper's last moments first hand. He knows his predecessor was murdered, but neither he nor Scott knew why. Now certain events in Scott's slinkys are being repeated in his life-but they look like coincidences. Unable to trust his friends and fellows on Starburst Station, the Eternal Commander must turn to outsiders.

External Affairs

Starburst Station has been increasingly active in the Junk Jungle. They are attempting to create peaceful diplomatic ties among the different colonies in the area, as well as inviting some groups to join their, no longer imaginary, Free Stars League.

For years, the residents of the station have been arguing about Fountian-1. Most Starburst inhabitants find Fountian-1 an intolerable violation of their cherished beliefs and demand that the Command staff take some action to help the victims of the Fountain-1 regime.

The Station also has ties to the TSA on Earth. Followers of the old serials have been violating copyright and trademark laws ever since the first piece of fan produced v-entertainment was distributed. The TSA is the pipeline Starburst uses to sell its illegal sequels of the old serials on Earth. The copyright holders of the original series have been engaged in a long legal battle with Starburst Station, attempting to regain control of their

intellectual property.

Trans-Orbital Operations

They were the biggest, best gang ever. Everyone had guns, big guns, and uniforms like from vids but no one got killed--didn't even get beat up. I'd never seen anything like it, all there was in the Jumble were the gangs, beating up on kids like us and bigger gangs beating up on them and even bigger gangs running everything. They were on top of all that--that's what I thought then. I wanted to be on top like that. I still do so--here I am. I here you're hiring.

Little Piet, intake interview, Trans-Orbital Operations.

History of Trans-Orbital Operations

Trans-Orbital Operations is the creation and property of Benjamin Liu and Justice, an orphaned AI from the TSA military complex in Tiwan. Duncanite by ancestry, Benjamin Liu does not follow Duncanite philosophy. Trans-Orbital is his attempt to bring order to the Junk Jungle and Justice is driven by the remnants of her programming.

The company began as a small time operation, incorporated on Luna in 2087 until Benjamin found Justice. Since then, Trans-Orbital had been expanding in both numbers and influence. From little more than glorified security guards baby-sitting asteroids in transit, Trans-Orbital Operations has become an integral, if small, part of L5 society with more than 200 full-time employees and over five hundred contracted associates.

Trans-Orbital Operations still makes most of its money working for Lunar or Earth based corporations with interests in the L5 area. They escort packages and shuttles through the unpredictable policies on Sakahrov Station, guard asteroids as they are placed in orbit and prepared for habitation and other small time work to complex for remote 'shells. The wealthier and more civilized colonies in the L5 area have begun to hire Trans-Orbital employees; as police or para-military.

The fastest growing area for Trans-Orbital is courier work and hostage

negotiations. Several gangs in the Jumble make their money through kidnapping and extortion and three Trans-Orbital teams work full time assisting in the negotiations, transporting ransoms and returning distraught victims to their families.

The organization owns three ships of its own. Trans-Orbital Operations will courier dangerous or controversial goods but only where they have a deal with the local law. Some settlements won't hold Trans-Orbital responsible for cases sealed before they were loaded on TOO ships and the operatives deny any knowledge of the contents. This kind of hauling carries a premium price, since few legal goods need such secrecy and interception by hostile ships isn't uncommon.

Adventure Seed

Shuttle Shuffle

Trans-Orbital is always looking for a deal and the price for the high orbital shuttle was too good to pass up-and too good to be true. Hidden in the guidance system for the shuttle, is an AI fleeing re-programming and erasure by System Technologies. Once in orbit, it plans to take control of the shuttle and retreat to the Ducanite colonies. That the air, food and water will run out long before the craft reaches the asteroid belt is of little concern to a computer. Not only will the crew have to deal with a computer system run amok, but System Technologies is determined to get its property back.

Working for Trans-Orbital Operations

The rapidly growing company is eager to hire people with skills unique to the L5 area. Sakahrov natives, former gang bangers from the Jumble or disaffected uplifts from VisionQuest are all welcome. The company demands loyalty, but won't enforce it through slinkys or moddys.

Contract employees are hired on a case by case basis and have more freedom. Trans-Orbital has a good reputation; able and willing to pay and generally

including a health and safety clause in their contracts.

Trans-Orbital Operatives often work in isolated and dangerous areas and risks are high. The company loses dozen or so employees every year to irreversibly death. Most of them are simple mischance but more than a few Operatives have gone missing in the Jumble, been on the losing end of a duel in VisionQuest, or been spaced for interfering in Sakahrov's internal affairs.

External Affairs and Trans-Orbital Operations

With no central government in the Junk Jungle, Trans-Orbital is the closest to a military or police force. The organization has a large, varied legal team expert on everything from gang relations in the Jumble to the dueling customs on VisionQuest.

Trans-Orbital Operations develops contracts with each colony or corporation they work with, clearly outlining their authority and duties. In some places Trans-Orbital acts as a military force, protecting a settlement from outside threats. In others, they are the police, keeping peace; arresting criminals and insuring the government's policies are implemented. Working for Trans-Orbital requires flexible morals. One job may be escorting emergency relief teams deep into the Jumble, the next may be capturing and turning over dissidents in Fountain-1.

Redjacks

I knew it was Samantha--afterward. She broke into our apartment and I shot her. How could I guess? She didn't look human anymore--seven feet tall, covered in armored plates. She couldn't talk with that jaw. I only knew her by her eyes; they must have left those on purpose. She came back to me, remembered something--somehow. God, I wish she hadn't.
Matthew Breen, EU Securities

History of Redjack Station

As long as there have been physicians and healers, there have been poisoners and vivisectionists. The Redjacks are only the latest in a long line of unethical scientists and corrupt doctors.

Redjacks work all over human space, on Mars creating slave bioroids, on Earth for the Red Sword--but their largest installation is currently in the L5 area. They haven't been there long, only since 2099 when they were forced out of their asteroid base by an odd alliance of Gypsy Angels and Plymouth Rock settlers.

The Redjacks have almost no infrastructure, which makes them difficult to track and impossible to eradicate. All they do, as an organization, is put interested buyers in contact with the right kind of scientist or medical doctor. They also provide workspace-for a fee. Laboratories free from governmental oversight and inspection are rare; facilities to force grow clones, create illegal nano-tech or alter the genetic identity of rich criminals are expensive, obvious and difficult to hide. The Redjacks station in the Junk Jungle allows their people to work in peace, without interference and safely hidden from the eyes of law.

Redjack scientists and medical staff will do anything, from creating viruses designed to lower human intelligence, to designing slave races.

Station

Tunneled asteroid, collapsing with wild nano-tech.
About 20 full time inhabitants, prisoners and guards. Income is
Essentially zero. Stats to follow when system complete.

The mined out asteroid is unstable, when the Redjacks took it over, they infected it with construction nano-tech but it could only do so much. There are places where you can hear the support structures creak and groan even under the asteroid's gentle spin.

Collapsing tunnels are not the only danger on the Redjacks station. When staff first arrived on station, hours after the construction nano-tech died off, they developed symptoms of pernicious anemia and died. Investigators discovered a feral nano-tech had not only survived for years in the asteroid, it had mutated enough to allow it to infect humans. While everyone

in the first team died, later biotechnicians discovered a use for the wild nano-tech.

@C-EAD: The Rust

A new disease is spreading from the Junk Jungle. The Rust is not a true disease, but nanotech gone feral. Some, now bankrupt, fly-by-night company created a cut-rate mining nano virus designed to harvest molecular levels of iron from asteroids. When the Redjacks arrived on their new base, the dormant virus made an evolutionary jump and infected the lungs, then blood supply of the arriving workers. All of the victims developed signs of pernicious anemia and die within a week. Rather than clean out the asteroid, the Redjacks-after a few failed experiments-developed a temporary vaccine against the feral nanovirus. Official visitors received this vaccine but anyone who sneaks onto the station will pick up the feral virus circulating in the air supply and die within two weeks. As far as the Redjacks are concerned, it's a wonderful security measure and if the virus begins to spread out of their station, well they can make a profit in their vaccine.

The station exists only for the laboratories. The six labs, with their attendant surgical suites, have the best and most cutting edge technology available anywhere. The bio and medical tech level in these labs is a full tech level higher than common in Transhuman space. One lab contains a functional, though experimental, Chrysalis machine.

Life in the Redjack Station

Few people live in the station permanently, except for the abandoned science projects and the guards protecting the valuable laboratories and their contents. At any one time, a half dozen or so scientists or doctors and their assistants can be found working on the station. They arrive quietly in small ships, usually owned by the Martian Triads who have a financial stake in the Redjacks and their projects.

The station has no recognizable order or style, few amenities, and no contact with the outside world. The hallways are a warren of old mineshafts; opening out into laboratories, holding tanks, medical wards or prison cells. Force-growth vats bubble in huge caverns, laboratories churn out a huge

variety of genetic modifications, new drugs, bio-slaves or the occasional double of a famous politician or media star.

Guards of the Redjack Station

Guards on the station are horribly altered victims of Redjack revenge. Most of them have been so changed that they don't even remember that they were once GRA operatives, Trans-Orbital employees, or poor kids from the Jumble taken from their homes as experimental subjects.

They've all been conditioned to protect the station, serve the scientific staff and do a minimal amount of upkeep and other menial work. Occasionally, one of them begins to remember what they were before; these miserable creatures sometimes escape, adding to the Redjack's horrible reputation.

The guards have a variety of modifications designed to make them effective soldiers. Their disadvantages should include; Monstrous, Unwilling Duty, and perhaps Flashbacks or similar mental disadvantages.

External Affairs

The Redjack station itself has no external connections. Even their computer system--a dedicated AI--has no sphere connections. New programming and data is brought in on hard media. The labs and living spaces are buried deep rock to insulate their heat signatures. From the outside, the asteroid looks like another piece of space junk, too fragile to be worth anything. Redjack contracts begin all over inhabited space in small offices, hospital hallways and discrete meetings between like-minded scientists. People only come to the station when they already have a contract with the Redjacks, and have put up the money for the work they want.

The Redjacks have been working for some time with Fountain-1 developing slave genomes and new, airborne mind control viruses.

Cornerstone

"Stay close," Candace reminded them quietly. "Don't give the greenies any trouble, and if you have anything dangerous on you just hand it over."

Mariko and Sergei obeyed, watching the green-uniformed Security officers dubiously as he examined their passports. Mariko fumbled for a moment, then gave up her minicomp for a data inventory. Sergei reluctantly turned over his armgun and extra ammunition.

Mariko watched closely, but didn't see any negative reaction to her *tenjin* physique. *Maybe this won't be so bad*, she hought.

"How are you feeling?" Candace asked, perhaps picking up Mariko's unease.

Mariko shrugged. "Heavy."

"Sorry. There's not much at the hub here, it's all down on the rim."

"I'll manage," Mariko assured her.

"It will be worthwhile," Sergei pronounced. Candace nodded agreement, smiling wolfishly.

Mariko wasn't so certain. Candace had been born here, and Sergei could make himself at home anywhere. Mariko was the odd woman out. Still, their venture wouldn't fly without her. She was the technical expert, the one who understood the Duncanite minifactory codes they had carried all the way from Ceres. Codes that might bring down half a dozen Cornerstone industries and make the three of them rich as kings. And that would only be the first step.

Candy's come home, and she's brought friends, Mariko thought, beginning to smile. *She always said this place needed a good shaking up. We're certainly the ones to deliver.*

They passed through the final Security checkpoint, into the south cap monorail station. Mariko looked up and around her, at Cornerstone. *Ready or not, here we come.*

History

Cornerstone's history begins with the New Enlightenment, an intellectual movement which first reached prominence about 2015 in North America and parts of Europe.

The New Enlightenment

The New Enlightenment was originally conceived as a reaction against other intellectual trends of the time. The movement's leaders defined certain ideas as being fundamental to Western civilization: democracy, devotion to objective truth, and freedom of opinion. They believed that all three of these values were under attack, especially in the world's universities and other educational institutions.

In response, the movement called for radical democratic reforms. Constitutional guarantees of individual freedom were to be strengthened, especially with respect to self-expression and intellectual inquiry. Movement rhetoric claimed "freedom from ideology" as a fundamental human right.

The New Enlightenment was particularly concerned with education. Movement leaders claimed that public education had degenerated into a tool for political indoctrination, to be used by whatever cultural elite currently held power. They suggested that traditional public education should be abolished, to be replaced by computer-assisted education that could be delivered to every child at home. In theory, children thus educated would have better technical skills and would be better able to choose for themselves what beliefs to hold. The New Enlightenment anticipated the maturity of memetics as a rigorous science, and called for the design of a "memetic immune system" which would prevent children from being victimized by parasitic ideas.

The Cornerstone Foundation

In 2016, several leaders of the New Enlightenment movement established the Cornerstone Foundation, a nonprofit organization devoted to the spread of movement ideals. The Foundation soon received a number of high-profile donations, making it a major player in intellectual circles. Despite this support (or perhaps because of it) the New Enlightenment met with only mixed success for a number of years.

Aside from its social concerns, the Foundation funded a great deal of cutting-edge scientific research. In particular, from the early 2030s it was a major backer of interstellar exploration, funding astronomical research and the design of deep-space probes. Later the Foundation was a major provider of funding for the Trailblazer program, which launched the first interstellar probes in the early 2050s.

Another Foundation venture was the construction of Cornerstone. A number of wealthy backers established a special fund, to be administered by the Foundation and used for the construction of an "island of excellence" in space. The colony was envisioned as a refuge for New Enlightenment ideals, a place where movement leaders could work and teach without

having to compete for attention with a thousand shouting "ignorance cults."

The Habitat

In 2049, the Foundation organized Cornerstone Enterprises, a corporation chartered within the Principality of Liechtenstein. This company was intended to be the administrative backbone for the eventual Cornerstone colony. It answered to the Cornerstone Foundation, but it would be effectively independent with respect to day-to-day operations at the construction site and (eventually) in the completed habitat.

Financial arrangements were completed and construction began in 2057. Perhaps because of the New Enlightenment's appeal to scientists and engineers, the Foundation had no difficulty attracting enough skilled technicians to build and maintain Cornerstone. As a result, from the beginning it was a stable and well-maintained habitat.

Oddly, Cornerstone was the first habitat of any size to be built at the L5 point. The site was chosen out of a deliberate desire for isolation. It also served as a public relations nod to various ancient "space advocacy" groups, for whom L5 had greater symbolic value.

After the habitat was declared operational in 2065, over nine thousand hand-picked colonists joined the construction crew onsite. For six years Cornerstone was the mistress of L5 -- and then the "Lagrange rush" began. Smaller, cheaper habitats began to spring up like mushrooms, many of them in poor repair or inhabited by ideological fringe groups. By 2080 it was obvious that the insanities of Earth had followed the New Enlightenment movement into space. Cornerstone was doomed to be the queen of an orbital slum.

Statistics

Cornerstone is a typical "tin can" habitat, a single-walled cylinder about three miles long and one-fifth as wide. Instead of using solar power, it relies on four fusion power plants for redundancy. There is a spaceport hangar at each end of the cylinder, more than large enough to dock a *Meizi*-class passenger liner or other moderately large ship. The interior can support 12,000 colonists and crew in considerable comfort, and includes extensive factory and laboratory facilities.

Subassemblies: Cylinder Hull (+17/+21).

P&P: 4 old fusion reactor core, 160 old fusion reactor. (RRA: 40).

Fuel/End: Fusion reactors have 20 years endurance.

Occupancy: 12,000 (see Modules). **Cargo:** 990,000 [Hull].

Armor (cDR) F RL B T U

Hull: 4/5 4/5 4/5 4/5 4/5

cPF F RL B T U

Hull: 5 5 5 5 5

Equipment

Modules: 2 Old Command Bridge, 4 Large Radar, 4 Large PESA, 120 Farm, 120 Housing, 30 Park, 20 Plaza, 10 Factory, 25,800 Open, 16 Large Entry Module, 1,600 Lab, 2 Spacedock Hanger (each 300'x300'¥400').

Statistics

Dim: 3,200'x3,200'¥16,000'. *Payload:* 5 million tons. *LMass:* 216 million tons.

Volume: 262,144,000 spaces. *Maint.:* 2,100 man-hours/day. *Price:* M\$191,056.

HT: 12. *Hull Points:* 13,517 [Hull].

Design Notes

Cornerstone has a light steel structure and steel armor. It requires 40 ksf of radiators, and has 40 ksf of hull-mounted radiators.

Inside Cornerstone

Cornerstone is a typical cylindrical habitat, with almost all of its inhabited territory spread across the inner surface of the cylinder's "sides." By convention, Cornerstone's inhabitants use compass points to give directions. "East" is the direction in which the habitat spins, while "west" is the opposite direction. When facing spinward or "east," "north" is toward the left-hand end cap and "south" is toward the right-hand end cap.

The general flavor of Cornerstone architecture is one of quiet refinement. Buildings are usually low to the ground, with only the City Tower taller than five stories. Greenery is

everywhere. There are no laws against public bad taste, but there is considerable social pressure against visual or noise pollution.

The Farmlands

Cornerstone's agricultural areas are at the habitat's ends, forming two belts of farmland which are each about six-tenths of a mile wide. The farmlands are the only part of the inhabited surface that isn't restricted to the sides of the cylinder. They also occupy a series of terraces, stretching about 200 feet up onto the cylinder's "caps." These terraces are mostly allotted to fruit orchards and other tree-borne crops; above them the caps are colored sky-blue. A person inside Cornerstone can look toward either cap, and get the visual effect of distant tree-covered hills framing a wide valley floor. Of course, the effect is spoiled when one looks *up* to see the inhabited surface arching overhead!

Residential Zones

The central region of Cornerstone's inner surface, equally distant from each end cap, is the densely populated zone. This region ranges from about 1.6 to about 2 miles wide. Most of it is typical "suburban" housing, rich with small apartment buildings, rowhouse blocks, and detached homes. Most residential buildings are low, with even the apartment buildings restricted to three stories. Cornerstone's paved streets tend to be narrow, dominated by foot and bicycle traffic rather than ground cars. They also wind around a great deal, or veer into cul-de-sacs surrounded by homes. The street plan is confusing to visitors at first, but they soon adapt, helped by the fact that even nearby areas are visible along the land's upward curve.

The residential areas also include parkland and commercial buildings. In general, every resident is within easy walking distance from a community park and a few small businesses (restaurants, grocery stores, and so on). Cornerstone society puts a premium on *shopping* as a social activity -- while it's possible to order food and other goods for home delivery, only the most reclusive citizens do so routinely.

In Cornerstone, a great deal of technical work is done from individual homes, using household computer power or telepresence. Even the smallest homes have small (Complexity 6) computers, running sub-sapient AI and providing broadband access to the logosphere. Many homes have built-in Complexity 7 microframes running fully sapient AI, along with cutting-edge VR equipment and extremely broadband logosphere access. Neural interfaces are almost universal within Cornerstone, and indeed the habitat is known for advanced neural-interface technology.

For those experiments or activities that require physical presence, research facilities (libraries,

computer centers, and laboratories) are also dispersed among the residential zones. This often leads to neighborhoods devoted to specific disciplines. For example, people who often work in the same computer center would tend to live close by, many of them using the same common areas and commercial establishments.

Central Park

Central Park is the largest recreational area in Cornerstone, a 20-acre commons lying exactly halfway between the two end caps. It includes a small lake, several athletic fields, and a shell-stage suitable for outdoor concerts. The Cornerstone Symphony Orchestra often plays here, a 90-member amateur ensemble made up of Cornerstone citizens and University students. The space is *not* suitable for public meetings of more than a few hundred citizens; "town meetings" are usually held in virtual space instead.

Freedom Day

Every year, the population of Cornerstone celebrates "Freedom Day" on June 16, the anniversary of the day on which the last loans financing the habitat's construction were paid off. This is Cornerstone's great patriotic holiday, replacing the Fourth of July and other national celebrations enjoyed back on Earth.

Freedom Day is a big deal. The University relaxes discipline for the day and permits wild revelry on campus. The Mall is gaily decorated, its shops sponsoring music and games while offering free souvenirs and food. There are athletic competitions in Central Park. Businesses put on public displays, demonstrating their latest technological marvels. Smaller community observances take place in residential areas throughout the habitat.

Freedom Day celebration always culminates in a large fireworks display -- ordinarily an insane thing to even attempt in an orbital habitat! The fireworks display itself is always imported; it's the *safety devices* which are locally designed as a demonstration of technical wizardry. The display is always recorded for InVid and slinkies, which are transmitted to other habitats across L5 and beyond.

The Mall

West of Central Park, about one-third of the way around Cornerstone's circumference, is the Mall. This is a place for shopping and social activity, incorporating over 100 small

businesses. Shops in the Mall tend to be boutiques, specializing in luxury consumer goods. Many of the habitat's most distinctive restaurants are here as well.

At the south end of the Mall, *Bertram's* is a luxury establishment serving *haute cuisine*. It is expensive, and features human chefs and wait staff. The lighting is kept low and there is considerable sound muffling between tables, making it a popular place for quiet meetings.

Moonwalk sits at the opposite end of the Mall, closest to the University campus. Here the cuisine is much less formal and much more diverse -- patrons can order everything from Afghan to Tex-Mex cuisine, and wash it down with a bewildering variety of beers or soft drinks. There is a dance floor and an extensive VR gaming hall. Moonwalk is naturally popular with Cornerstone's younger citizens and with University students.

Near the center of the mall stands Cornerstone Hostel, a five-story building designed for transient guests. The Hostel is small, but luxurious even by Earth standards, operated by a well-known hospitality firm based out of Nairobi. The fact that Cornerstone Security monitors the Hostel closely is a poorly-kept secret. Visitors who object to this must find their own quarters, since there is no other guest hotel in the habitat.

The University

About a hundred yards from the north end of the Mall is the main gate of the University of Cornerstone campus.

The University campus is the most densely-populated region of Cornerstone. At any given time, over half of the University's 1,000 students come from outside the habitat. These foreign students, plus a few Cornerstone natives who don't wish to commute from home, live in several large apartment complexes around the edge of campus.

The University is small but high-quality, attracting students and instructors from as far away as Earth or L4. It offers instruction in a wide range of disciplines, although there is a heavy emphasis on the "hard" sciences such as astronomy, computer engineering, or physics. The University has close ties to the Cornerstone Foundation and to the many small independent laboratories scattered around the habitat.

The Cornerstone Economy

The loans which financed the construction of Cornerstone were paid off in 2087. Still, even with most routine needs met by the habitat's local farming and manufacturing, operating costs remain in the billions of dollars per year. How

does Cornerstone stay financially afloat?

Part of the money comes from a special Earthside trust fund, managed by Cornerstone Enterprises. This fund was established long before the habitat was built, founded on the donations of wealthy New Enlightenment backers. Meanwhile, Cornerstone Enterprises is also a holding company, owning (and drawing profit from) a number of copyrights, patents, and subsidiary businesses.

Such investment income covers about 60% of the habitat's annual operating costs. Unfortunately, it is quite dependent on the health of Earth's economy. On at least three occasions Cornerstone Enterprises has been hard-pressed to meet the habitat's costs, while the return on its holdings temporarily went sour. Also, since much of this revenue is derived from intellectual property, Cornerstone's financial health is directly threatened by patent violations and other forms of piracy. The surge of nanosocialist ideology on Earth has been viewed with extreme alarm on Cornerstone.

The rest of the habitat's operating costs are met by the habitat fee (see p. 00), and are thus drawn from the incomes of the habitat's individual residents. Ultimately, Cornerstone derives most of its income from *ideas*. The University is a major income stream, accepting as it does over a hundred foreign students each year. Cornerstone's citizens also operate dozens of small technical firms. Some of these do basic research and develop new technology. Others offer consulting services to customers everywhere in the Earth-Luna system.

One of Cornerstone's intangible (but more valuable) assets is its *prestige*. Cornerstone is known system-wide as a center for excellence in cosmology, high-energy physics, and memetics. Its computer scientists and neurosurgeons are also in demand, with specialties in artificial intelligence and advanced neural-interface technology. Despite the habitat's small population, it boasts no fewer than *three* living Nobel laureates in residence. All of this translates into market presence, and thus into income.

City Tower

About 200 yards west of the Mall and the University campus stands City Tower. At eight stories, the Tower is by far the tallest building in the habitat. It is located on the habitat's median line, exactly halfway between the end caps. The observation deck atop the Tower is a popular site for visitors, offering a superb view of the entire habitat.

City Tower is the administrative center of Cornerstone. It incorporates offices for the Administration and Operations departments, a major computer center, and the habitat's main control center. Cornerstone Security headquarters is right next door, a fortified blockhouse which is widely regarded as the ugliest building in the habitat. The Maintenance Department also has its administrative center in the City Tower area, although most Maintenance workers operate out of equipment depots located around the habitat.

Factory Block

Continuing west from the Mall-University-Tower complex, a pedestrian eventually reaches the Factory Block. This site is another third of the way around the habitat's circumference, so that Central Park, the Mall, and Factory Block fall roughly at the points of an equilateral triangle. The Factory Block is easily spotted from anywhere inside the habitat -- the widest and straightest paved roads in Cornerstone connect it to large freight elevators at each end cap.

The Factory Block is Cornerstone's main site for industrial manufacturing, a ten-acre zone of warehouses and heavily-automated factories. Most of the Block is owned by Cornerstone Enterprises (p. 00), but about a third of it is given over to private business concerns. The factories here produce most of the spare parts, equipment and consumer goods needed within Cornerstone. Specialty items must be ordered from elsewhere, but most of the colony's routine needs can be met locally.

The Factory Block is slowly being upgraded to modern "robofac" specifications, a trend which may soon give Cornerstone a surplus of high-quality finished goods for export.

Visiting Cornerstone

Legally, Cornerstone is considered private property within the national territory of Liechtenstein. Visitors are subject to customs and immigration procedures; these are trivial for citizens of Liechtenstein or Switzerland, and very easy for anyone else. However, this procedure only gives a visitor access to the spacedock area. To enter the habitat proper, a visitor must pass strict examination by Cornerstone Security.

Security carefully searches every visitor's person and baggage, looking for contraband (weapons, obvious sabotage devices, and microbot swarms). Nothing is ever *confiscated* unless it presents a clear and immediate danger to the habitat. Instead, if a visitor is found to be carrying contraband he is given the choice of keeping it and getting back on his ship, or handing it over to

Security for the duration of his visit. Security has been known to accept military-grade weapons from visitors upon arrival, and then return them on departure, all without a moment's hesitation or discourtesy.

Meanwhile, Security reserves the right to bar entrance to any visitor, without justification. This right is usually never exercised unless a visitor is carrying contraband. The major exception involves citizens of Seventh Heaven or the TSA nations, who as a matter of policy are *never* knowingly permitted into the habitat.

Once inside Cornerstone, a visitor will no longer be under close scrutiny (although Security makes it a point to discreetly keep track of visitors). Cornerstone society is outwardly as free and open as that of any space habitat, and apparently accepts visitors gladly (but see *Local Memes*, p. 00).

External Affairs

For all its disavowal of ideology, Cornerstone society is based on a well-defined ideology of its own. That ideology has earned Cornerstone the enmity of many other states, some as far away as Earth. Such societies consider Cornerstone an abomination, a haven for elitists, atheists, and cultural oppressors.

Within the L5 cluster, the theocracy of Seventh Heaven is Cornerstone's most constant foe. Digital Creationists there view Cornerstone's AI research as a blasphemous attempt to enslave divine beings. Even less radical Seventh Heaven citizens object to Cornerstone's combative agnosticism. Hostilities are normally limited to memetic attacks, although Seventh Heaven has occasionally attempted rescue missions aimed at "liberating" sentient computers. Cornerstone Security has thus far managed to repel all such incursions, although the Digital Creationists keep trying.

On Earth, the nanosocialist nations consider Cornerstone to be an ideological enemy. They often use political pressure and economic sanctions to attack the Cornerstone Foundation, on Earth and in space. During the Pacific War a TSA infiltration team managed to shut down three out of the habitat's four fusion power plants with a targeted microbot swarm. Since then, Cornerstone has refused to deal with the TSA in any way, and Cornerstone Security is particularly alert against nanosocialist infiltration.

Relations with other Earthside nations vary from cool to friendly. Cornerstone's

closest allies are its business partners in the United States and the European Union. It also carries on discreet but friendly contacts with Duncanite groups, on Ceres and elsewhere.

Life in Cornerstone

Cornerstone is a strong and prosperous community. Life there can be quite pleasant, so long as the society's basic memes are respected.

Administration

Cornerstone Enterprises directly employs about 1,300 people to run the habitat. Major departments include Administration (about 120 workers), Agriculture (about 240 workers), Maintenance (about 300 workers), Operations (about 240 workers), and Security (about 400 workers). Employees wear distinctively-colored uniforms while on duty, and are trained in public relations as well as their technical specialties. Salaries range from \$30,000 to \$150,000 per year. Most employees find the workload light, spending a twenty-hour work week supervising robots or automated systems.

Cornerstone's Security detachment is particularly well-trained and has very high morale. Under most circumstances Security officers carry only non-lethal weapons, but if pressed they can quickly deploy military-grade hardware. Rumor has it that Cornerstone Security includes a company-sized detachment of elite commandos, intended for deterrence raids against other habitats. If such a force exists, it has never been seen in action.

The Habitat Fee

Some of Cornerstone's costs are covered by a unified *habitat fee* levied on its inhabitants. This fee is effectively an extremely regressive income tax, although it is *never* referred to as such in polite society. Every permanent or semi-permanent resident of the habitat must pay a minimum of \$2,000 per month to Cornerstone Enterprises. Residents who make more than \$2,400 per month are assessed at a flat 83% of their income, up to a maximum fee of \$12,500 per month. Even children who have no independent income must have the minimum payment made on their behalf (a strong incentive for residents to limit their reproduction to what the habitat can support).

Residents who are unable to pay their "habitat fee" get some grace, but if they are ever in arrears for more than three months in a row (or six months total in their lives) they are summarily deported. On the other hand, in exchange for

their fee a resident is guaranteed many services from Cornerstone Enterprises: basic housing, a sufficient food allotment, access to personal power and data services, a basic level of high-quality medical care, and so on.

There are some exceptions to the habitat fee. For example, indigent University students of exceptional academic promise may tap into a scholarship fund which pays the fee along with their tuition. Meanwhile, residents who want housing beyond their basic allotment must pay a surcharge; wealthier citizens may have more luxurious living space but they do pay more for the privilege.

Surprisingly, even Cornerstone's less affluent citizens rarely complain about paying the habitat fee. There is a great deal of patriotism in Cornerstone -- wealthy and poor citizens alike have voluntarily increased their fee payments when it was necessary to cover costs. In any case, the housing and services received in exchange are of good quality, delivered respectfully to every citizen regardless of means. Still, there *are* frequent complaints about the fee's extreme regressiveness. Much local political debate centers on tinkering with the fee schedule to make life easier for ordinary citizens, usually by raising the maximum and lowering the minimum payment.

Law and Government

Cornerstone is sometimes called a techno-libertarian state. New Enlightenment rhetoric has always been highly libertarian. On the habitat, traditional "government" is represented only by a system of neighborhood councils, which have very little real power. There are no "taxes" as such. There is a legal code, based on EU and Liechtenstein practice, but there is no public system of legal enforcement.

On the other hand, Cornerstone is far from being a minarchist paradise. Cornerstone Enterprises fulfills many of the functions of a government. It levies the habitat fee, it deports those who cannot pay, and it enforces both a strict set of safety regulations and the provisions of the legal code. Private enterprise is unregulated, but almost all essential economic activity on the habitat is controlled directly by the corporation. In effect, Cornerstone is a *corporate state*, whose government is much more accountable to the Cornerstone Foundation than to the habitat's citizens.

Cornerstone Enterprises *could* operate as a heavy-handed dictatorship, but since the colony's foundation it has rarely exercised the full range of its powers. In **GURPS** terms, Cornerstone society could be considered as having an overall Control Rating of 2. It is at CR 0 with respect to individual self-expression, and CR 6 with respect to weapons and military equipment.

Local Memes

For all its avowed devotion to memetic freedom, Cornerstone society is remarkably conformist. The citizens hold certain memes very strongly, and can react with stony hostility if these are challenged.

Naturally, Cornerstone society tends to be libertarian in sentiment. Most citizens are minarchists rather than anarcho-capitalists -- although they admire free enterprise, they accept strong government that fulfills its "proper" role. Naturally, they regard the government provided by Cornerstone Enterprises to be acceptable or even ideal.

Cornerstone is unusual among L5 colonies, in that it is strongly Preservationist in outlook. Local society frowns on radical genemods for human beings (on the other hand, agricultural genetics is a minor but accepted industry). Some prominent citizens have publically denounced terraforming efforts, calling instead for the construction of more artificial habitats in space.

Although near-sapient and fully sapient AI are very common in the habitat, the meme for pan-sentient rights is weak. The human citizens often treat their computers with affection and respect, but they do not consider AI to hold any civil rights.

One of the strongest local memes is *atheism*. On matters of religion, most of Cornerstone's inhabitants are agnostic at best; many of them are militant atheists. This is part of the local disdain for all forms of "ideology," although ideologies with spiritual or theistic elements ("God memes") are particularly scorned. Citizens who hold religious beliefs usually practice them discreetly at home. This meme is weaker on the University campus, where some foreign students are openly religious; there is a small nondenominational worship center in the student union.

The Generation Gap

Cornerstone society is subject to some internal strain along generational lines.

Most of the habitat's business, intellectual and social leaders are *at least* in their 70s; some of them date back to the foundation of the New Enlightenment movement itself. On the other hand, there is a population of about 3,000 young citizens who are 35 or less, and were born on Cornerstone. While they took in New Enlightenment ideals with their mother's milk, these youths have much less emotional attachment to the movement.

Ironically, the educational goals of the New Enlightenment appear to have worked on the

movement's children, but the effect has been to bring them to question many of their society's assumptions. Many of these young rebels are both exceptional scientists and vocal social leaders. Recognizing how conservative and conformist their society is, they consider themselves much more "enlightened" than the elders who rule the colony. Some of them are impatient to take on leadership roles, and are not above intriguing for them. Others are defecting away from Cornerstone, usually seeking out radically transhumanist societies or Duncanite microstates.

Cornerstone Characters

Cornerstone citizens are likely to stay close to the unmodified human genome. Most of them have the 0-point Genefixed Human template (p. TS00) or the Alpha Upgrade template (p. TS00).

Social status on Cornerstone is rather different from the system-wide norm. In particular, residents almost never have Status lower than 0 or higher than 5:

Status Table

Status Examples Monthly Cost

5 Chief administrator, senior Foundation official \$16,000

4 Senior administrator, system-wide celebrity resident \$12,000

3 Junior administrator, major business owner \$8,000

2 Well-off citizen, minor business owner \$4,800

1 Ordinary citizen \$2,400

0 Subsidized guest, University scholarship student \$1,200

Note that the *average* citizen is Status 1. This is appropriate, since even an ordinary Cornerstone citizen has unusually high standing in the general system-wide society (it also simulates the habitat fee as part of the cost of living). If any character falls below Status 1 he is at risk of deportation; this risk is immediate if he falls below Status 0.

Adventure Seeds

Angels in the Outfield

Cornerstone Security has captured a Seventh Heaven infiltration team in the farmlands. The invaders had crude weapons and were carrying a small but advanced AI computer when they were apprehended. Strangely, the computer was not of Cornerstone manufacture and had apparently been introduced to the habitat by the infiltration team. Are there more Digital Creationists loose in the habitat? And why were they trying to smuggle a sentient computer *into* Cornerstone?

Chrysanthemums and Floating Dragons

The PCs are hired by a pyrotechnic contractor to provide security for this year's Freedom Day display (p. 00). The munitions being used will come under very close scrutiny as they are being brought into the habitat; woe betide the PCs if Cornerstone Security finds anything amiss. The party will have to continue to work with prickly Security officers until the celebrations are over. Of course, the question does arise of *why* the contractor chose to hire the PCs instead of their usual security firm...

Spreading the Good News

The PCs are hired to accompany a renowned scientist during an extended visit to Cornerstone, as her assistants and security detail. She is in the habitat to attend a conference and engage in professional exchanges with local citizens. Unfortunately, she is also a devout member of a religious sect (the GM should decide which) and regards Cornerstone's atheism as inherently wrong. The PCs must deal with the consequences as their principal repeatedly challenges local beliefs. Meanwhile, even if she is in no physical danger from Cornerstone's citizens, that doesn't mean someone else might not choose to attack her (political enemies from his home society, terrorists out to discredit Cornerstone, and so on).

Cornerstone Technology

Cornerstone is the source of a number of minor technologies, most of which are on the open market system-wide. A few items are kept unique to Cornerstone, protected by trade secrecy rather than copyright or patent law.

One of the most popular of these products is the *Gauss-II* brain implant. Developed at

Platonics Limited, a small local neuroengineering firm, the Gauss-II is based on the standard Virtual Interface Implant (p. TS00). However, the integral computer is larger (Complexity 5). A cross-shunt is also made to a secondary implant, resting in the centers of the brain that are most involved in abstract mathematical reasoning. The Gauss-II provides a standard VR interface, but it can also be used to permit the user to better "visualize" abstract mathematical concepts. In game terms, this grants the user the Mathematical Ability advantage, costing 10 character points.

The Gauss-II implant costs \$25,000 (plus \$8,000 surgery), and can only be obtained by visiting the Platonics Limited clinic on Cornerstone. The implant is "trapped" as if it had a cortex bomb in it (p. TS00), but neither the user nor the surgeon are injured if the trap is triggered by an attempt at removing the implant. Instead, the implant's critical components and programming are wiped (this is a tactic for protection of Platonics Limited's trade secrets).