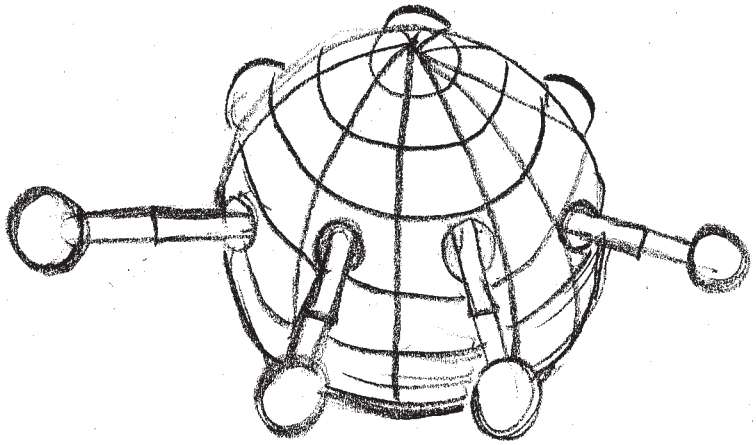
OUTPOST ALPHA

in orbit around the Europa, the sixth moon of Jupiter



Outpost Alpha is the center of government, education, and culture for the Alpha-Omega Complex of human colonies in the Jupiter mini-system

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A BRIEF HISTORY OF ALPHA-OMEGA

During the 21st century on Earth, lack of environmental and humanitarian concern lead to a breakdown of governments and ecosystems all over the planets. Greedy power harvesters, drilling and selling fossil fuels for their own monetary gain and survival stripped the planet of fuel sources. Over population of the planet lead to a depletion of natural resources. War and famine ravaged Earth. Governments all over the planet crumbled, leaving a few power hungry monarchies to rule the planet

In an effort to save humanity and develop a plan to replensih a devastated home, friendly elements of faction democratic governments all over the planet joined in solidarity to build a series of outpost colonies in the solar system.

At the beginning of the 22nd century, a plan was in place to construct the first of these colonies and send pilgrims out to live among the planets. The first pilgrims inhabited space colonies in orbit around Mars. Terraforming research and development was conducted on the surface of the planet, while the pilgrims made their home in orbiting space colonies.

By mid-22nd century, the population of the Mars outpost colonies numbered in excess of 20 million people representing all people groups of Earth. Production of food and resources became dangerously insufficient and a second phase had to be added to the survival plan. The second phase of colonization of the solar system moved several thousand people to an outpost in orbit around Europa in the late 22nd century. Presently, we are in the third phase of solar system colonization. The third phase is called **ALPHA-OMEGA**.

Alpha-Omega consists of a series of outpost colonies in orbit around the moons of Jupiter and beyond. The center of government, education, and culture is located at **OUTPOST ALPHA** in orbit around Europa. This report deals mainly with Outpost Alpha.

The second outpost colony, **ALPHA-THETA**, was designed to explore the solar system and beyond, to develop new astronomical technologies, calculate plans for future outpost locations, and study the compostion and inhabitablity of the planets and moons of our solar system and beyond. (Details of the Alpha-Theta Project are provided in another project entry, separate from this one.)

The third outpost colony, FLI (Frozen Liquids Incorporated), is in orbit around Europa, and was established to explore and mine water on the surface of Europa. Most of the water supplied to Outpost Alpha and the other colonies of the Jupiter mini-system is supplied by FLI.

The fourth outpost colony, SIGMA IOTA, is in orbit around Io. Io was established to harvest radioactive energy from the vast energy sources of Io and provide power resources to Sigma Iota and the other colonies of the Alpha-Omega. (Details of the Sigma Iota Project are provided in a project entry separate from this one.)

The fifth outpost colony, TRITAN, in orbit around Callisto, was established to explore energy resources and harvest energy from the volcanic surface of Callisto. Power harvested on and around Callisto is distributed to other Callisto outposts as well as outposts in orbit around Europa, Io , and Ganymede.

The sixth outpost colony of Alpha-Omega is called BIOZONE. Since all people groups are represented in the colonies of Mars and Jupiter, BioZone took on the task of ensuring the survival of animal and plant species from Earth. Through the use of cryogenics, embryos from Earth animals have been preserved in earlier colonies and transported to BioZone for reintroduction into controlled biomes. Research and development of food production processes is also being accomplished at BioZone. (Details of the BioZone Project are provided in a project entry separate from this one.)

The seventh outpost colony of Alpha-Omega is SURVIVOR 2300. S-2300 was established to provide security and protection for all colonies of the Alpha-Omega complex. Police protection and military capabilites are provided by S-2300. With an outpost complex as large and viable as Alpha-Omega, the services of S-2300 are completely necessary to ensure that survival of our way of life. (Details of the Survivor 2300 Project are provided in a project entry separate from this one.)

This brief history brings us to the present date of 04.01.2300.

WHY DID WE CHOOSE THE MOONS OF JUPITER?

We chose the Jupiter mini-system of Io, Europa, Ganymede and Callisto because these moons of Jupiter are locked together by tidal forces and their orbits around Jupiter are in sync with one another. Io orbits Jupiter twice for each orbit of Europa which in turn orbits twice for each orbit of Ganymede. We could establish a base of operation on each moon or in orbit around each moon as thus establish a network of communication and transport between our main base and our outpost colonies. This has worked very well for many years.

We also chose the mini-system of Jupiter becasue Europa is the only place in the solar system, besides Earth, where liquid water exists in significant quantities. In order to maintain a human colony (or colonies) outside the realm of Earth, water and oxygen were our primary concerns. Europa also has an atmosphere of oxygen. Unlike the oxygen in Earth's atmosphere, Europa's is not of biologic origin. It is generated by sunlight and charged particles hitting Europa's icy surface producing water vapor which is subsequently split into hydrogen and oxygen. The hydrogen escapes leaving the oxygen. Ganymede possesses an atmosphere of oxygen similar to that of Europa.

Another consideration in choosing the jupiter mini-system was Io, the most curious and volcanically active moon in the solar system. Io cuts across Jupiter's magnetic field lines, generating an electric current. Though small compared to the tidal heating caused by Io’s proximity to Europa and Ganymede, this current carries more than 1 trillion watts–thus we have a build-in source of power ready for harvesting.

Before explaining Outpost Alpha (part of the Alpha-Omega complex), we feel that you should know some important facts about the Jupiter mini-system.

SOME FACTS YOU SHOULD KNOW ABOUT JUPITER

JUPITER is the fifth planet from the Sun and by far the largest. Jupiter is more than twice as massive as all the other planets combined (318 times Earth).

orbit:	778,330,000 km (5.20 AU) from Sun
diameter:	142,984 km (equatorial)
mass:	1.900e27 kg

Jupiter is the fourth brightest object in the sky (after the Sun, the Moon and Venus; at some times Mars is also brighter). It has been known since prehistoric times. Galileo's discovery, in 1610, of Jupiter's four large moons Io, Europa, Ganymede and Callisto (now known as the Galilean moons) was the first discovery of a center of motion not apparently centered on the Earth. It was a major point in favor of Copernicus's heliocentric theory of the motions of the planets; Galileo's outspoken support of the Copernican theory got him in trouble with the Inquisition.

Jupiter was first visited by Pioneer 10 in 1973 and later by Pioneer 11, Voyager 1, Voyager 2 and Ulysses. The spacecraft Galileo is currently in orbit around Jupiter and will be sending back data for at least the next two years.

The gas planets do not have solid surfaces, their gaseous material simply gets denser with depth (the radii and diameters quoted for the planets are for levels corresponding to a pressure of 1 atmosphere). What we see when looking at these planets is the tops of clouds high in their atmospheres (slightly above the 1 atmosphere level).

Jupiter is about 90% hydrogen and 10% helium (by numbers of atoms, 75/25% by mass) with traces of methane, water, ammonia and "rock". This is very close to the composition of the primordial Solar Nebula from which the entire solar system was formed. Saturn has a similar composition, but Uranus and Neptune have much less hydrogen and helium.

Our knowledge of the interior of Jupiter (and the other gas planets) is highly indirect and likely to remain so for some time. (The data from our atmospheric research

probe goes down only about 150 km below the cloud tops.)

Jupiter probably has a core of rocky material amounting to something like 10 to 15 Earth-masses.

Above the core lies the main bulk of the planet in the form of liquid metallic hydrogen. This exotic form of the most common of elements is possible only at pressures exceeding 4 million bars, as is the case in the interior of Jupiter (and Saturn). Liquid metallic hydrogen consists of ionized protons and electrons (like the interior of the Sun but at a far lower temperature). At the temperature and pressure of Jupiter's interior hydrogen is a liquid, not a gas. It is an electrical conductor and the source of Jupiter's magnetic field. This layer probably also contains some helium and traces of various "ices".

The outermost layer is composed primarily of ordinary molecular hydrogen and helium which is liquid in the interior and gaseous further out. The atmosphere we see is just the very top of this deep layer. Water, carbon dioxide, methane and other simple molecules are also present in tiny amounts.

Recent experiments have shown that hydrogen does not change phase suddenly. Therefore the interiors of the jovian planets probably have indistinct boundaries between their various interior layers. Three distinct layers of clouds exist consisting of ammonia ice, ammonium hydrosulfide and a mixture of ice and water. The vivid colors seen in Jupiter's clouds are probably the result of subtle chemical reactions of the trace elements in Jupiter's atmosphere, perhaps involving sulfur whose compounds take on a wide variety of colors, but the details are unknown. The colors correlate with the cloud's altitude: blue lowest, followed by browns and whites, with reds highest. Sometimes we see the lower layers through holes in the upper ones.

Early expectation was that Jupiter's atmosphere would contain about twice the amount of oxygen (combined with the abundant hydrogen to make water) as the Sun. But it actually has a concentration much less than the Sun's. Surprisingly, the uppermost parts of the atmosphere are warm and dense.

Jupiter and the other gas planets have high velocity winds which are confined in wide bands of latitude. The winds blow in opposite directions in adjacent bands. Slight chemical and temperature differences between these bands are responsible for the

colored bands that dominate the planet's appearance. The light colored bands are called zones; the dark ones belts. The bands have been known for some time on Jupiter, but the complex vortices in the boundary regions between the bands were first seen by Voyager. The data from our research probe indicates that the winds are even faster than expected (more than 400 mph) and extend down into as far as the probe was able to observe; they may extend down thousands of kilometers into the interior. Jupiter's atmosphere was also found to be quite turbulent. This indicates that Jupiter's winds are driven in large part by its internal heat rather than from solar input as on Earth.

The Great Red Spot (GRS) has been seen by Earthly observers for more than 300 years (its discovery is usually attributed to Cassini, or Robert Hooke in the 17th century). The GRS is an oval about 12,000 by 25,000 km, big enough to hold two Earths. Other smaller but similar spots have been known for decades. Infrared observations and the direction of its rotation indicate that the GRS is a high-pressure region whose cloud tops are significantly higher and colder than the surrounding regions. Similar structures have been seen on Saturn and Neptune. It is not known how such structures can persist for so long.

Jupiter radiates more energy into space than it receives from the Sun. The interior of Jupiter is hot: the core is probably about 20,000 K. The heat is generated by the Kelvin-Helmholtz mechanism, the slow gravitational compression of the planet. (Jupiter does NOT produce energy by nuclear fusion as in the Sun; it is much too small and hence its interior is too cool to ignite nuclear reactions.) This interior heat probably causes convection deep within Jupiter's liquid layers and is probably responsible for the complex motions we see in the cloud tops. Saturn and Neptune are similar to Jupiter in this respect, but oddly, Uranus is not.

Jupiter is just about as large in diameter as a gas planet can be. If more material were to be added, it would be compressed by gravity such that the overall radius would increase only slightly. A star can be larger only because of its internal (nuclear) heat source. (But Jupiter would have to be at least 80 times more massive to become a star.)

Jupiter has a huge magnetic field, much stronger than Earth's. Its magnetosphere extends more than 650 million km (past the orbit of Saturn!). (Note that Jupiter's magnetosphere is far from spherical -- it extends "only" a few million kilometers in the

direction toward the Sun.) Jupiter's moons therefore lie within its magnetosphere, a fact which may partially explain some of the activity on Io. The environment near Jupiter contains high levels of energetic particles trapped by Jupiter's magnetic field. This "radiation" is similar to, but much more intense than, that found within Earth's Van Allen belts. IT WOULD BE IMMEDIATELY FATAL TO AN UNPROTECTED HUMAN BEING.

Our atmospheric probe discovered a new intense radiation belt between Jupiter's ring and the uppermost atmospheric layers. This new belt is approximately 10 times as strong as Earth's Van Allen radiation belts. Surprisingly, this new belt was also found to contain high energy helium ions of unknown origin.

Jupiter has rings like Saturn's, but much fainter and smaller (right). They were totally unexpected and were only discovered when two of the Voyager 1 scientists insisted that after traveling 1 billion km it was at least worth a quick look to see if any rings might be present. Everyone else thought that the chance of finding anything was nil, but there they were. It was a major coup. They have since been imaged in the infrared from ground-based telescopes and by Galileo.

Unlike Saturn's, Jupiter's rings are dark (albedo about .05). They' are composed of very small grains of rocky material. Unlike Saturn's rings, they contain no ice.

Particles in Jupiter's rings don't stay there for long (due to atmospheric and magnetic drag). Our research craft found clear evidence that the rings are continuously resupplied by dust formed by micrometeor impacts on the four inner moons, which are very energetic because of Jupiter's large gravitational field. The inner halo ring is broadened by interactions with Jupiter's magnetic field.

FACTS ABOUT JUPITER'S MOONS

Jupiter has 28 known satellites: the four large Galilean moons, 12 smaller named ones, plus 12 more small ones discovered recently but not yet named.

- Jupiter is very gradually slowing down due to the tidal drag produced by the Galilean satellites. Also, the same tidal forces are changing the orbits of the moons, very slowly forcing them farther from Jupiter.
- Io, Europa and Ganymede are locked together by tidal forces into a 1:2:4 orbital resonance and their orbits evolve together. Callisto is almost part of this as well. In a few hundred million years, Callisto will be locked in too, orbiting at exactly twice the period of Ganymede and eight times the period of Io.
- Jupiter's satellites are named for other figures in the life of Zeus.
- Many more small moons have been discovered recently but have not as yet been officially confirmed or named.

Satellite	Distance (000 km)	Radius (km)	Mass (kg)	Discoverer	Date
Metis	128	20	9.56e16	Synnott	1979
Adrastea	129	10	1.91e16	Jewitt	1979
Amalthea	181	98	7.17e18	Barnard	1892
Thebe	222	50	7.77e17	Synnott	1979
Io	422	1815	8.94e22	Galileo	1610
Europa	671	1569	4.80e22	Galileo	1610
Ganymede	1070	2631	1.48e23	Galileo	1610
Callisto	1883	2400	1.08e23	Galileo	1610
Leda	11094	8	5.68e15	Kowal	1974
Himalia	11480	93	9.56e18	Perrine	1904
Lysithea	11720	18	7.77e16	Nicholson	1938
Elara	11737	38	7.77e17	Perrine	1905
Ananke	21200	15	3.82e16	Nicholson	1951
Carme	22600	20	9.56e16	Nicholson	1938
Pasiphae	23500	25	1.91e17	Melotte	1908
Sinope	23700	18	7.77e16	Nicholson	1914

Values for the smaller moons are approximate.

CALLISTO

CALLISTO ("ka LIS toh") is the eighth of Jupiter's known satellites and the second largest. It is the outermost of the Galilean moons.

orbit:	1,883,000 km from Jupiter
diameter:	4800 km
mass:	1.08e23 kg

Callisto is only slightly smaller than Mercury but only a third of its mass.

Unlike Ganymede, Callisto seems to have little internal structure; however there are signs from recent Galileo data that the interior materials have settled partially, with the percentage of rock increasing toward the center. Callisto is about 40% ice and 60% rock/iron. Titan and Triton are probably similar.

Callisto's surface is covered entirely with craters. The surface is very old, like the highlands of the Moon and Mars. Callisto has the oldest, most cratered surface of any body yet observed in the solar system; having undergone little change other than the occasional impact for 4 billion years.

The largest craters are surrounded by a series of concentric rings which look like huge cracks but which have been smoothed out by eons of slow movement of the ice. The largest of these has been named Valhalla. Nearly 3000 km in diameter, Valhalla is a dramatic example of a multi-ring basin, the result of a massive impact.

Like Ganymede, Callisto's ancient craters have collapsed. They lack the high ring mountains, radial rays and central depressions common to craters on the Moon and Mercury.

Another interesting feature is Gipul Catena, a long series of impact craters lined up in a straight line. This was probably caused by an object that was tidally disrupted as it passed close to Jupiter (much like Comet SL 9) and then impacted on Callisto.

Callisto has a very tenuous atmosphere composed of carbon dioxide. A weak magnetic field around Callisto indicates a salty fluid below the surface.

EUROPA

EUROPA ("yoo ROH puh") is the sixth of Jupiter's known satellites and the fourth largest; it is the second of the Galilean moons. Europa is slightly smaller than the Earth's Moon.

orbit:	670,900 km from Jupiter
diameter:	3138 km
mass:	4.80e22 kg

Europa and Io are somewhat similar in bulk composition to the terrestrial planets: primarily composed of silicate rock. Unlike Io, however, Europa has a thin outer layer of ice. Europa has a layered internal structure perhaps with a small metallic core.

But Europa's surface is not at all like anything in the inner solar system. It is exceedingly smooth: few features more than a few hundred meters high have been seen. The prominent markings seem to be only albedo features with very low relief.

There are very few craters on Europa; only three craters larger than 5 km in diameter have been found. This indicates a young and active surface. The precise age of Europa's surface is an open question.

The images of Europa's surface strongly resemble images of sea ice on Earth. Beneath Europa's surface ice lies a layer of liquid water, perhaps as much as 50 km deep, kept liquid by tidally generated heat. Europa is the only place in the solar system besides Earth where liquid water exists in significant quantities.

Europa's most striking aspect is a series of dark streaks crisscrossing the entire globe. The larger ones are roughly 20 km across with diffuse outer edges and a central band of lighter material. These streaks were produced by a series of volcanic geysers.

Europa has a very tenuous atmosphere (1e-11 bar) composed of oxygen. Of the 61 moons in the solar system only four others (Io, Ganymede, Titan and Triton) are known to have atmospheres. Unlike the oxygen in Earth's atmosphere, Europa's is not of biologic origin. It is generated by sunlight and charged particles hitting Europa's icy surface producing water vapor which is subsequently split into hydrogen and oxygen. The hydrogen escapes leaving the oxygen.

GANYMEDE

Ganymede ("GAN uh meed") is the seventh and largest of Jupiter's known satellites. Ganymede is the third of the Galilean moons.

orbit:	1,070,000 km from Jupiter
diameter:	5262 km
mass:	1.48e23 kg

Ganymede is the largest satellite in the solar system. It is larger in diameter than Mercury but only about half its mass. Ganymede is much larger than Pluto.

While Callisto has a uniform composition, Ganymede is differentiated into a three layer structure: a small molten iron or iron/sulfur core surrounded by a rocky silicate mantle with a icy shell on top. In fact, Ganymede is similar to Io with an additional outer layer of ice.

Ganymede's surface is a roughly equal mix of two types of terrain: very old, highly cratered dark regions, and somewhat younger (but still ancient) lighter regions marked with an extensive array of grooves and ridges. Their origin is clearly of a tectonic nature, but the details are unknown. In this respect, Ganymede may more similar to the Earth than either Venus or Mars . Reasearch is being conducting now by the University of Alpha Omega (UAO)

A tenuous oxygen atmosphere, very similar to the one found on Europa, exists around Ganymede.

Ganymede has extensive cratering. The density of cratering indicates an age of 3 to 3.5 billion years, similar to the Moon. Craters both overlay and are cross cut by the groove systems indicating the the grooves are quite ancient, too. Relatively young craters with rays of ejecta are also visible (left).

Unlike the Moon, however, the craters are quite flat, lacking the ring mountains and central depressions common to craters on the Moon and Mercury. This is probably due to the relatively weak nature of Ganymede's icy crust which can flow over geologic time and thereby soften the relief. Ancient craters whose relief has disappeared leaving

only a "ghost" of a crater are known as palimpsests (right).

Ganymede has its own magnetosphere field embedded inside Jupiter's huge one. This is probably generated in a similar fashion to the Earth's: as a result of motion of conducting material in the interior.

IO

IO ("EYE oh") is the fifth of Jupiter's known satellites and the third largest; it is the innermost of the Galilean moons. Io is slightly larger than Earth's Moon.

orbit:	422,000 km from Jupiter
diameter:	3630 km
mass:	8.93e22 kg

The pronunciation "EE oh" is also acceptable.

In contrast to most of the moons in the outer solar system, Io and Europa may be somewhat similar in bulk composition to the terrestrial planets, primarily composed of molten silicate rock. Io has a core of iron (perhaps mixed with iron sulfide) with a radius of at least 900 km.

Io's surface is radically different from any other body in the solar system. It came as a very big surprise to the Voyager scientists on the first encounter during th late 20th century. They had expected to see impact craters like those on the other terrestrial bodies and from their number per unit area to estimate the age of Io's surface. But there are very few, if any, impact craters on Io. Therefore, the surface is very young.

Instead of craters, Io has volcanic calderas. Some of the volcanoes are active! This may have been the most important single discovery of the early Voyager missions; it was the first real proof that the interiors of other "terrestrial" bodies are actually hot and active. The material erupting from Io's vents appears to be some form of sulfur or sulfur dioxide. The volcanic eruptions change rapidly. In a period as short as four months some volcanoes may stop and others start up. The deposits surrounding the vents also change visibly. Io's surface is very active indeed.

Io has an amazing variety of terrains: calderas up to several kilometers deep, lakes of molten sulfur, mountains which are apparently NOT volcanoes, extensive flows hundreds of kilometers long of some low viscosity fluid (a form of sulfur), and volcanic vents. Sulfur and its compounds take on a wide range of colors which are responsible for Io's variegated appearance.

The lava flows on Io's surface are composed mostly of various compounds of molten sulfur. However, subsequent ground-based infra-red studies indicate that they are too hot for liquid sulfur. One current idea is that Io's lavas are molten silicate rock. Recent observations indicate that the material may be rich in sodium. Or there may be a variety of different materials in different locations.

Some of the hottest spots on Io may reach temperatures as high as 2000 K though the average is much lower, about 130 K. These hot spots are the principal mechanism by which Io loses its heat.

The energy for all this activity probably derives from tidal interactions between Io, Europa, Ganymede and Jupiter. These three moons are locked into resonant orbits such that Io orbits twice for each orbit of Europa which in turn orbits twice for each orbit of Ganymede. Though Io, like Earth's Moon always faces the same side toward its planet, the effects of Europa and Ganymede cause it to wobble a bit. This wobbling stretches and bends Io by as much as 100 meters (a 100 meter tide!) and generates heat the same way a coat hanger heats up when bent back and forth. (Lacking another body to perturb it, the Moon is not heated by Earth in this way.)

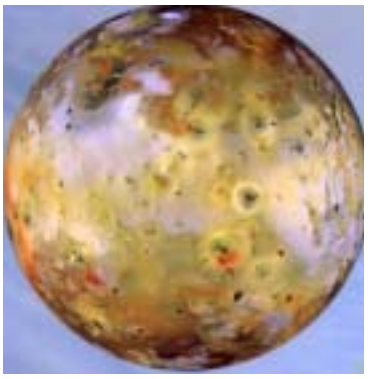
Io also cuts across Jupiter's magnetic field lines, generating an electric current. Though small compared to the tidal heating, this current may carry more than 1 trillion watts. It also strips some material away from Io which forms a torus of intense radiation around Jupiter. Particles escaping from this torus are partially responsible for Jupiter's unusually large magnetosphere.

Io has its own magnetic field, as does Ganymede.

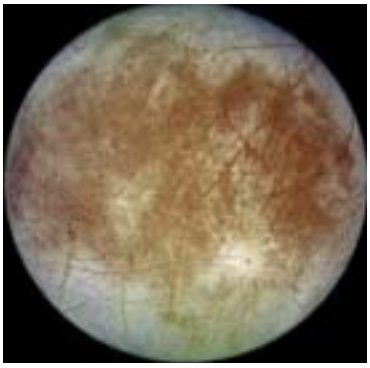
Io has a thin atmosphere composed of sulfur dioxide and perhaps some other gases.

Unlike the other Galilean satellites, Io has little or no water. This is probably because Jupiter was hot enough early in the evolution of the solar system to drive off

the volatile elements in the vicinity of Io but not so hot to do so farther out.



Io



Europa

Callisto

Ganymede

OUTPOST ALPHA COLONY

The main hub of Outpost Alpha, called the Central Sphere, is located at the center of the colony (see Appendix 1 on page 21). From the Central Sphere, corridors (similar in appearance to the spokes of a wheel) radiate outward. At the terminus of these corridors are smaller spheres, called Suborbs (suburbs). Each suborb contains a community of residents, complete with all the amenities of a community–small retail outlets, town halls, libraries, small restaurants, and community businesses. Each suborb is home to 1,000 to 5,000 residents. Suborbs are organized according to the professional status of the residents. For instance, one suborb might be home to primarily professors and their families, while another suborb might be home to engineers, scientists, medical professionals, or business professionals and their families.

Suborbs can be developed and added to the complex as needed. Currently, Outpost Alpha consists of 12 suborb communities, one university suborb and one resort suborb. Suborbs are constructed in levels. The Outer Level (level nearest the outer walls of the orb) contains the housing units, small emergency units, food markets, non-denominational chapels and libraries. The Middle Level contains retail outlets, orb governmental offices, medical facilities and restaurants, The Inner Level contains transporation terminals, orb businesses and light industries.

Suborbs can be retracted (reeled in) to the Central Sphere as needed. The Central Sphere contains docking ports for each suborb, into which the suborbs lock-in while retracted. Instances of retraction may be times of meteor storm alerts, security alerts, or other emergencies. When retracted, the electromagnetic shield can be activated. The EM Shield is designed to repel incoming debris or munitions, and can be controlled to pulse additional energy to push near objects away from the colony.

The Central Sphere contains the metropolitan aspects of the colony. Major businesses, manufacturing facilities, shopping malls, entertainment centers, major restaurants, hospital and emergency facilities and government offices are all part of the Central Sphere. Outpost Alpha Education Modules are located in the Central Sphere. All residents much attend school full-time (8 hours per day, 5 days per week, 44 weeks per year) from the age of 6 through the age of 16. A child enters the first module on his/her

sixth birthday and graduates from module 12 on his/her sixteenth birthday. 12 modules of education must be completed in this timeframe. Overtime learning is demanded of individuals who find learning more difficult than average students. Accelerated learning is scheduled for individuals who show gifted-learning abilities. Accelerated learners still graduate at 16, but with a more advanced diploma and better university placement.

BUILDING MATERIALS OF OUTPOST ALPHA

Outpost Alpha structures are all constructed of a transparent polymer steel developed during Phase Two of the colonization of the solar system. This transparent polymer steel (TPS) material is extremely strong and durable. Because of the transparent quality of TPS, computers and persons manning the observer stations along the latitudinal and longitudinal axis of the Central Sphere can keep close watch on the suborbs and other facilities around the Central Sphere.

ENERGY SOURCES

A band of solar collectors encircles the Central Sphere. These collectors, also constructed of TPS, gather energy from the sun and send it to converters. This solar power is used to illuminate the suborbs and other facilities around the Central Sphere.

The major power source for all other functions of Outpost Alpha, as well as illumination for the Central Sphere, is from reactor cores imported from the Sigma Iota Colony in orbit around Io and fusion energy cores imported from the Tritan Colony, also in orbit around Io. Outpost Alpha breeder reactors and fusion reactors are housed off-site at facilities a safe distance away from the Outpost Alpha colony and all other colonies in the Jupiter mini-system. Energy from these reactors is beamed to collectors near Outpost Alpha and stored in facilities near the Central Sphere. A bi-product of fusion energy production is water.

WATER SOURCES

To ensure that sufficient amounts of water are available to the Central Sphere and its suborbs, several methods of water collection are employed. Waste water is recycled and redistributed. Water is manufactured by fusion (as an industry of the Central Sphere), and moderate amounts of water are imported from FLI (Frozen Liquids Incorporated), the water mining operation in orbit around Europa. Water from FLI arrives at Outpost Alpha in transporters as frozen sheets. Water utilities in each suborb store, melt, purify, and distribute the water.

GOVERNMENT OF OUTPOST ALPHA AND ALPHA-OMEGA

The Central Sphere of Outpost Alpha is home to not only the government offices of the outpost, but also the government offices of Alpha-Omega. Alpha-Omega governement offices are located at the Core of the Central Sphere. Outpost Alpha governmental offices are located at Level One (the next level outward from the core).

Alpha-Omega, Outpost Alpha, and all of the associated colonies of the Jupiter mini-system embrace a democratic form of government. The head of the Alpha-Omega system of government is the Alpha Major and his/her subordinate staff. The head of the Outpost Alpha government is the Beta Major and his/her subordinate staff. Each suborb is represented in government by the Gamma Major and his/her subordinate staff. Representatives, Gamma Majors, Beta Majors, and Alpha Majors are all chosen through democratic elections, selected by popular electronic vote.

Governmental Counsel chambers and assembly halls are located on Level One of the Central Sphere.

SECURITY

The Governmental Office of Security (GOS) is outsourced to the services of the Survivor 2300 Colony. Security personnel and military personnel are trained on Survivor 2300 and assigned duties at Outpost Alpha and the other colonies of the Jupiter mini-

system.

TRANSPORTATION

The Governmental Office Transportation (GOT) is housed on Level One of the Central Sphere. All maintenance and scheduling of transports is coordinated through GOT. All transportation systems on Outpost Alpha use CPS Units (Coordinate Positioning Units). Coordinates of destination are keyed into the CPS unit and the mode of transport automatically executes the travel. Transportation is accomplished in one of several methods.

(1) Teleportation: Teleportaion stations are located on Level One of the Central Sphere. Teleportation is best suited for long distance travel, such as between the colonies of Alpha-Omega and colonies of Mars or Saturn.

(2) Inter-Colonial Transport (ICT): 20-60 seat shuttle crafts are used for travel between Outpost Alpha and the other colonies of the jupiter mini-system. Arrivals and departures are from terminals along the Outer Level of the Central Sphere. Pods transport ICT travelers to and from the travel stations on Level One.

(3) Family Transports (FT): small 4-passenger pods transport families from coordinate to coordinate throughout the outpost. These pods are powered electromagnetically.

(4) Corridor Pods (CP): Electromagnetic pods transport 10-30 people through connecting corridors between suborbs and the Central Sphere.

INDUSTRY AND RETAIL

On Levels Two through Twelve of the Central Sphere are the industries and business of Outpost Alpha. The entrepreneurial freedoms of Outpost Alpha allow almost any business endeavor. No morally questionable businesses are permitted. Manufacturing facilites produce all needed goods of the colonists. Food import and processing plants are located on these levels. Most food is imported from the BioZone Colony, but some food is produced or manufactured on these levels. Earner wages are distributed

in the form of electronic credits (ECs). Purchases are made by EC debits for the buyer's account. Banking facilities are located throughout all levels of the Central Sphere, outer facilities and suborbs. Colonists of the Alpha-Omega system who use a different monetary system must exchange their money for credits before purchases can be made in Outpost Alpha.

UNIVERISTY OF ALPHA-OMEGA (UAO)

The University of Alpha-Omega is located in a free-floating (unattached) orb orbiting in conjunction with Outpost Alpha. The University is involved in major studies of research theories such as warps and creation of black holes and wormholes. UAO makes extensive use of data transmitted from the Alpha-Theta Explorer Colony. Students who attend UAO from off-colony live in dormitories on-campus. Students attending UAO from Outpost Alpha have the option of living on-campus or living at home and commuting to and from school. Campuses of UAO are located at each of the Jupiter mini-system colonies. These campuses provide educational opportunities designed to match the expertise of the colony's purpose (i.e. students attending UAO-Sigma Iota study reactors, radioactive energy, power production, etc.). Students attending UAO-Outpost Alpha, come to the university under the Colonial Exchange Program (CEP). CEP students must be sponsored by a resident of one of the suborbs of Outpost Alpha. CEP students attending UAO campuses at other colonies, must be sponsored by a resident of that colony. Advanced degrees are offered in the following disciplines:

(1) Aerospace Engineering
(2) Civil Engineering
(3) Mechanical Engineering
(4) Propulsion
(5) Research and Development
(6) Logistics
(7) Medicine
(8) Business Administration
(9) Government

(10) Military Science
(11) Manufacturing
(12) Arts
(13) Biological Engineering
(14) Mining
(15) Mechanics
(16) Individual Studies

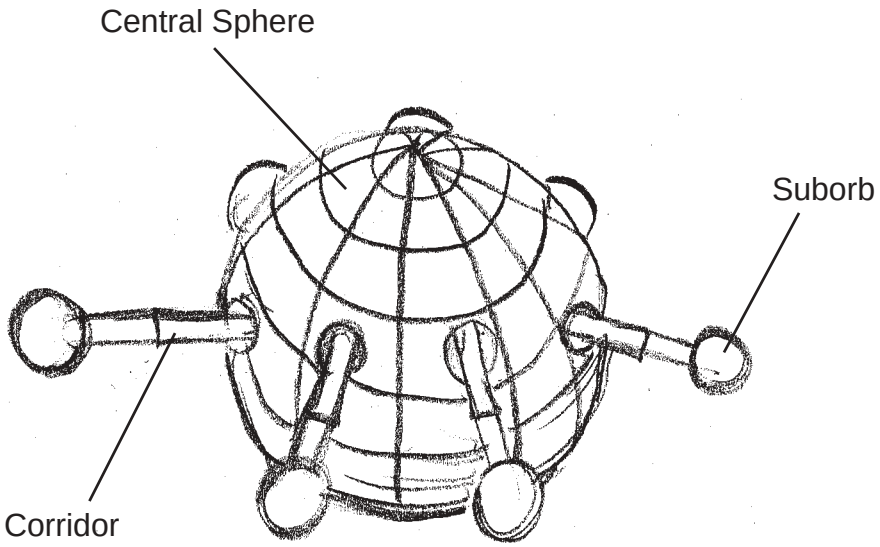
OUTPOST ALPHA RESORT COMPLEX

One of the suborbs of Outpost Alpha is the Outpost Alpha Resort Complex. Colonists from all colonies of Alpha-Omega are welcome to vacation at the Resort. Consider this the Disney World of the 24th century. Resort hotels are located throughout the complex, complete with white sand beaches and tropical breezes. Restaurants representing a variety of cuisines are available. The largest mall of the solar system is located in the resort complex. Virtual rollercoasters, flight simulators, extreme sports modules, and otherworld adventures are all part of the package at the resort complex. A world class sports stadium hosts inter-colonial games on a regular basis. Sports training facilites are also located in the resort complex.

THE FUTURE

The ultimate plan for our colony and all of the colonies of Alpha-Omega is to return to our home planet, Earth. Through all of the research and development that we have accomplished over these past decades, we are perfecting terraforming techniques. Our hope is to reinvigerate Earth through terraforming and repopulate the planet . . . in the very near future.

APPENDIX 1: OUTPOST ALPHA



WORKS SITED

Our “Outpost Alpha” project was developed through a series of brainstorming sessions. During these sessions we would bring books and web addresses to the club meetings, talk about what new information we had discovered, brainstorm ideas, and incorporate them into our design. Here is a list of some of the resources we used for our research.

http://www.seds.org/billa/tnp/

http://sse.jpl.nasa.gov/features/planets/jupiter/

http://www.nasm.edu/ceps/etp/jupiter/

http://www.jpl.nasa.gov/galileo/fact.html

http://www.space.com/

http://www.nasa.gov/

http://www.nss.org/

Mason, Robert Grant; Life in Space; Little, Brown and Company; Boston, MA, 1983.

McMannus, Jason; Voyage Through the Universe: The Far Planets; Time-Life Books; Alexandria, VA, 1990.

Several daily eNewsletters including:

spacenews@SPACE.com

JPLNews@jpl.nasa.gov

NASA Science News