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Concepts

Ship

A ship represents any artificial construction in space that the party has influence over. These can be transport ships, mining vessels, military ships or even space stations. Ships consist of a **Ship Class** that set the basic stats, like payload capacity and can be customized with **Ship Modules** to customize it for a certain role. In addition to their modules any ship can carry as much of any resource as the **Transfer** allows.

Planet

A planet refers to any natural satellite at which ships can park. A planet may be a source of **Resource** and can contain **Resource** and **Ship Module**.

Ship Class

A ship class determines the base **Ship Module** for a ship as well as the maximum cargo capacity, **Delta-V** and **Specific Impulse**. Ship classes can be build in a **Shipyards** if it is fitted appropriately* (cf **Shipyards**) and then fitted with modules afterwards.

Ship Module

A ship module is an entity that can be fitted to a ship. To fit a module onto a ship is instant for the purpose of this simulation. The modules can be anything from production facilities to military equipment to **Shipyards** parts. Some, like **heatshield** or **droptank water** provide a special benefit, while others provide an increase to certain stats. Most modules have a **Weight** associated with them, so certain **Transfer** are limited in the types of modules they can bring. Modules can be build in a **Shipyards** if it is fitted appropriately* (cf **Shipyards**).

Ship Module

A stat (short for statistical measurement of ability) is a measure of capability of a **Ship** to do a certain task. The stats modeled in this simulation are **Health**, **Attack** and **Defense** for **Ordnance Kinetic** and **Boarding** attacks, **Initiative** and **Power**

Delta-V

A measure of capability of the ship to perform certain **Transfer**. Decreases with increasing payload.

Specific Impulse

A measure of engine efficiency. Determines how much **Delta-V** decreases with increasing payload.

Weight

The prime measurement of quantity of a **Resource** or size of a **Ship Module**. Weight is measured in 'counts', where 1 count corresponds to roughly 10 metric tons. The count is often omitted in user interface. Physically knowledgeable readers should know that weight is simply used as an alias for mass in the cosmonautics jargon. A tradition that is carried over from shipping and aviation.

Ordnance

A type of attack that represents attacks by mostly missile/torpedos that deal damage by their carried ordnance. These can be chemical explosives or tactical nuclear weapons. Ordnance weapons tend to be slow-moving, but powerful. Ordnance defense can be provided by armor or point-defense systems.

Kinetic

A type of attack that represents attacks by hyper-velocity cannons, like rail- or coilguns. Kinetic weapons tend to provide quick, hard to avoid damage and get more powerful the higher the relative velocities of the ships. Kinetic defense can only be provided by special armor.

Boarding

TBD

Health

A family of **Ship Module** measuring the amount of damage that the ship can take. Split up by attack type.

Attack

A family of **Ship Module** measuring the amount of damage that the ship can deal. Split up by attack type.

Defense

A family of **Ship Module** measuring the amount of damage that the ship can negate. Split up by attack type.

Initiative

A **Ship Module** measuring a combination of accuracy and evasiveness of a ship in combat. A ship with higher initiative gets to deal damage before a ship with low one. In the simulation, initiative directly relates to the number of attacks a ship can make before a ship with 0 initiative.

Power

A **Ship Module** measuring the surplus power a reactor can provide. This mostly refers to the surge power that military ships can bring in combat to power modules like railguns, coilguns power-intensive ACS. Power can be increased with modules like **reactor**

Resource

A resource represents a certain collection of goods needed to build a modules of ship. Resources are stored and produced on a planet-by-planet level. Resources can be transported between planets by any **Ship** in a **Transfer**. A special resource is **water**, which is used as fuel every **Transfer**

Kinetic

TBD

Shipyard

A shipyard is a collection of modules that can be used to build modules and ships. There are 4 shipyard modules: **manufacture offices**, **large storage**, **workshop**, **wetdock**. Each collection of **large storage** & **workshop** can build modules. Each collection of **workshop** & **wetdock** can repair ships. Each collection of all 4 can build ships.

Transfer

A transfer of a single **Ship** between **Planet**. A transfer is defined by the departure and arrival times. By default the times are set to give the transfer with the least **Delta-V**, thus able to carry the most payload. The arrival time can be rushed or the departure time delayed in cost for more **Delta-V**. Depending on how much **Delta-V** the transfer costs, how much **Weight** the ship carries and if the engine is hydrogen consuming, the ship will use a certain amount of **water** as fuel. More exotic **Ship Class** may use different materials a fuel. The fuel will be lost from the departing **Planet**. If the planet cannot provide enough fuel, the transfer cannot take place.

Independance

'Independance' is a property of a Planet that indicates its level of autonomy. If independance exceeds 100, you loose control over the place. The planet will gain autonomy and become either friendly or hostile depending on their Opinion. Independance can be lowered by the placement military ships in orbit

Opinion

'Independance' is a property of a Planet that indicates its relationship to the to the player. It can be raised by large stockpiles / industry on the planet and lowered by military presence and certain buildings

Resources

Water (H-O-H).

The basis of known life. The universal solvent. Water needs no introduction

Food

Mostly consists of beans, fungus, vegetables and concentrated nutriment. Prepared on-site

Steel

A very strong iron alloy fundamental to industrial construction projects

Electronics

Resistors, Capacitors, Diodes, Transistors and Integrated Circuits

Hydrogen (H-H)

High-performance fuel and chemical reagent.

Oxygen (O=O)

Fundamental for human life and common byproduct in industrial processes

Carbon Dioxide (C=O=C)

Common byproduct that can be recycled into Carbon and Oxygen

Carbon (C)

Defining atom for organic chemistry and foundational for much of chemical engineering. Transported as Coal

Iron Ores

Iron oxide extracted from rock. Can be smelted into steel

Aluminium Ores

Aluminium oxide extracted from rock. Can be smelted into aluminium

Aluminium

Crucial metal for high-specific-strength alloys used in shipbuilding

Rock

Collection of minerals and ores, as they are found in nature

Biomass

Biological matter that can be used by plants to grow into food

Waste

Generally impure, unusable water. Result of both biological and industrial processes

Polymers

Plastics, Rubber, Resins, Carbon fiber etc.

Ship modules

<p><u>Heatshield</u></p> <p>Allows more efficient maneuvers around Titan and low Saturn orbit</p>	<p><u>Hydrogen Drop-tank</u></p> <p>This expandable tank allows a ship to hold 10 extra counts of hydrogen. Ejected during flight</p>
<p><u>Water extractor</u></p> <p>Extracts water from icy moons</p>	<p><u>Primitive rock extractor</u></p> <p>This low-tech rock extractor has been designed specifically to bootstrap a metal industry on small rocky moons and asteroids. It requires no advanced components.</p>
<p><u>Rock extractor</u></p> <p>A more advanced, more efficient rock excavator, worthy of a self-sufficient industrial power</p>	<p><u>Ore Extractor</u></p> <p>Extracts aluminium and iron ore from rock. Fundamental part in metallurgy</p>
<p><u>Carbon Filter</u></p> <p>Extracts carbon from the atmosphere. Performs sub-optimally outside of an atmosphere</p>	<p><u>Electrolyser</u></p> <p>Splits water into hydrogen and oxygen by applying a voltage.</p>
<p><u>Fuel cell</u></p> <p>Recombines hydrogen and oxygen into water. This reaction releases energy</p>	<p><u>Steel Smelter</u></p> <p>The steel smelting industry is vital for any major construction project.</p>
<p><u>Aluminium Smelter</u></p> <p>Aluminium alloys are indispensable for high-strength, low-weight products, like ships.</p>	<p><u>Habitat</u></p> <p>A collection of residential, commercial and service buildings that can accommodate around 1500 people in total.</p>

<p><u>Carbon Splitter</u></p> <p>Splits carbon dioxide into oxygen and carbon</p>	<p><u>Waste Treatment</u></p> <p>Part of the life support system, cleaning and re-purposing water from habitats</p>
<p><u>Farms</u></p> <p>A combination of aquaponics and densely packed bean, fungus and fruit plantages.</p>	<p><u>Polymers Factory</u></p> <p>Polymers are one of the most versatile and useful materials in human history. They are required in lots of advanced products</p>
<p><u>Semiconductor Laboratory</u></p> <p>Semiconductors are simultaneously very hard to manufacture and essential for most modern technology. Although we can never hope to match the computer technology from Argentina or Mariner, basic electrical components and low-end integrated circuits are within our reach given enough investment and the expertise of Mimas polytechnic school.</p>	<p><u>Small shipyard offices</u></p> <p>Administrative and design offices. Needed in order to build ships and more complex technologies</p>
<p><u>Shipyard storage facility</u></p> <p>Warehouses for storing parts and material. Needed for larger, more complex production pipelines, like that of ships</p>	<p><u>Workshop</u></p> <p>Construction Workshops. Needed in order to build most ships and modules or repair ships</p>

<p style="text-align: center;"><u>Wet Dock</u></p> <p>Dock, where ships can be build and repaired. 'Wet' docks keep ships exposed to the vacuum.</p>	<p style="text-align: center;"><u>Dry Dock</u></p> <p>Dock, where ships can be build and repaired. 'Dry' docks pressurize the entire area around the ship. Construction in dry-docks is much more efficient, but the large volume of atmosphere leaks air at a significant rate.</p>
<p style="text-align: center;"><u>Clean room</u></p> <p>Clean rooms are required to manufacture special high-tech components, like electronics, optics or medicine.</p>	<p style="text-align: center;"><u>Naval gun</u></p> <p>Conventional chemical weapons sometimes still find uses on the modern battlefield</p>
<p style="text-align: center;"><u>Railgun</u></p> <p>High-velocity kinetic weapon that needs extra energy to fire.</p>	<p style="text-align: center;"><u>Missiles</u></p> <p>Tactical non-nuclear missiles. Basic ordnance used in combat</p>
<p style="text-align: center;"><u>Light armor</u></p> <p>A lighter, thinner armor, granting basic protection to ships.</p>	<p style="text-align: center;"><u>Armor</u></p> <p>A full suite of heavy composite armor for military ships</p>
<p style="text-align: center;"><u>Point-defence cannons</u></p> <p>High-volume machine cannons provide a good defense against missiles, torpedoes and drones.</p>	<p style="text-align: center;"><u>High-fi Attitude Control System</u></p> <p>A high-accuracy attitude control system ensuring precise targeting is crucial to strike before anybody else does.</p>

<p><u>Sailed Reactor</u></p> <p>While most ship classes have a power regeneration system that can support the most basic ship functions, some modules require a dedicated, 'sailed' reactor.</p>	<p><u>Geothermal power plant</u></p> <p>On tidally active worlds, it can be useful to harvest the power of tides directly</p>
<p><u>Invasion Equipment</u></p> <p>small arms, APCs, supplies, even tanks ... Everything to arm local forces with lethal equipment.</p>	<p><u>Aircraft</u></p> <p>Very effective fighting force uniquely suited for atmospheric planetary bodies (Titan)</p>
<p><u>Water Drop-tank</u></p> <p>This expandable tank allows a ship to hold 10 extra counts of water. Ejected during flight</p>	<p><u>Tactical Sail</u></p> <p>Tactical sails provide temperature control for smaller ships. Mostly used by smaller military vessels</p>
<p><u>Ship Sail</u></p> <p>The name sail is colloquially given to the temperature control system of a ship, because of their prominence in the appearance of the ship, giving it facimilty to old seagoing vessels</p>	<p><u>Industrial Sail</u></p> <p>Larger sails that are almost exclusively used in industrial stations to provide cooling for power-intensive processes or reactors.</p>
<p><u>Industrial Reactor</u></p> <p>Large nuclear reactor for industrial stations.</p>	<p><u>Heatpump</u></p> <p>Small heatpump to cool down other modules to cryogenic temperatures.</p>

<p><u>Industrial Heatpump</u></p> <p>Larger heatpump to cool down other modules to cryogenic temperatures. Useful for producing hydrogen at scale</p>	<p><u>Small shuttles</u></p> <p>Small shuttles suited for establishing a ground connection with small, airless bodies. Allows to bring primary resources up from space</p>
<p><u>Spaceplanes</u></p> <p>Spaceplane can perform transport duties to the surface much more efficiently, for planetary bodies with an atmosphere</p>	<p><u>Launch vehicles</u></p> <p>Larger vehicles, that can service all moons at all conditions. Good for large industrial applications</p>
<p><u>Launch loop</u></p> <p>A large structure that exists separately to the station, connected to the ground</p>	<p><u>Barracks</u></p> <p>Training military personal is essential for the existence of any self-relying organization since the beginning of history.</p>
<p><u>Windtunnel</u></p> <p>Essential installation to test aeronautical vessels. Also provides a new way to increase the efficiency of space-faring vessels</p>	<p><u>Ballistics lab</u></p> <p>Facility equipped to produce and test military equipment from small arms and artillery to air-to-space missiles</p>
<p><u>Bio lab</u></p> <p>Laboratory working on testing life support, food processing and medical technology and adapting them for our current application.</p>	<p><u>Nuclear Enrichment Facility</u></p> <p>Uranium can be found in some quantities across the solar system, but it must be enriched in facilities like this before it can be used in reactors or weapons.</p>

<p><u>Precision Workshp</u></p> <p>Some manufacturing requires tolerances that can only be achieved by specially trained personal and special machinery</p>	
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Ship classes

C3G-022 'Spermwhale'

A larger variant that carries triple the fuel and triple the engines of the Hedgehog. Notably, it has the capacity to transport module usually reserved for large stations, like shipyard docks.

Capacity	Δv	I_{sp}
300	6	4.5

C1G-998 'Hedgehog'

Despite being nowadays classified as a light freightship, the C1K was the largest cargo ship at the time of its construction. With simple hydrogen-oxygen combustion engines, this design was ideal to haul large amount of cargo with cislunar space. After loosing popularity around the 2060s, some modified version made it to the outer planets and found some popularity due to their large maintenance ecosystem and their independence from nuclear fuel.

Capacity	Δv	I_{sp}
100	6	4.5

Station 10M

General Cosmonautics space station bus is a structural, thermal and power framework that can hold 10 metric kilotonns of cargo. It is often used for medium sized habitats, shipyards and logistics points. The station has just enough propulsion to maintain orbit and attitude and cannot be used to transport equipment between points

Capacity	Δv	I_{sp}
1000	0	1

N1Q-034 'Hawk'

One of the earliest truly commercially successful nuclear thermal cargo spacecraft, the Hawk played a large role in making some interplanetary colonies financially successful. The vessel is still useful today and its comparably low-complexity cheap nuclear engine makes its construction approachable.

Capacity	Δv	I_{sp}
100	12	10

Cruiser

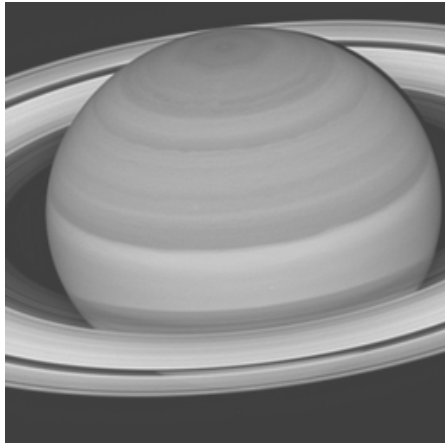
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Capacity	Δv	I_{sp}
40	12	10

Planets

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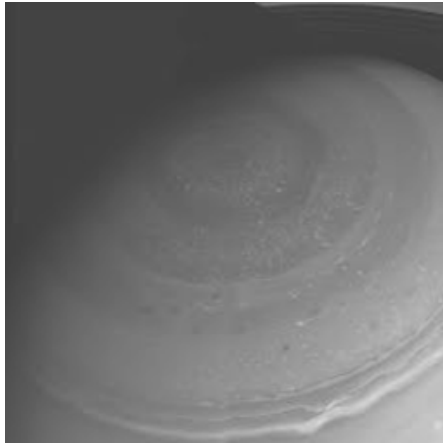
Saturn



Mass	5.68×10^{26} kg
Atmosphere present?	Yes
Dominant organization	Formerly GK

The 6th 'proper' planet around the Sun. Most people born here will never live outside it's gravitational and social sphere of influence. The monolithic ringed sphere is an ever-present background to all mundane and extraordinary activity that takes place on its Moons.

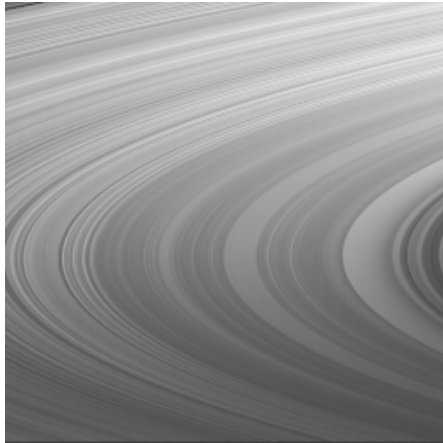
Low Orbit



Mass	0 kg
Atmosphere present?	Yes
Orbital Radius	6×10^4 km
Orbital Period	0 D 4 H
Dominant organization	Independent Traders

Not a planetary body, but more of an abstract location. Several stations are set up here, grazing the atmosphere to collect hydrogen and helium from Saturn. There used to be more, but the collapse of GK lead to abandonment of a lot of station de-orbiting in a matter of days. Low orbit is easy to get to with proper heat shielding, but much trickier to leave.

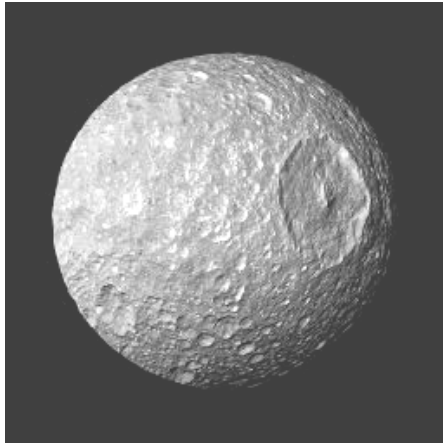
Encke Gap



Mass	0 kg
Atmosphere present?	No
Orbital Radius	1.34×10^5 km
Orbital Period	0 D 13 H
Dominant organization	Encke Community

Another location. The Encke Gap started a popular launching destination for retrieving various resources (mostly water) from the A-ring. Over time, a sizable quasi-independent community accumulated around a certain cluster in the Encke gap. This community mostly survived to this day and is willing to let us build our own stations here, as long as we pay them a small fee.

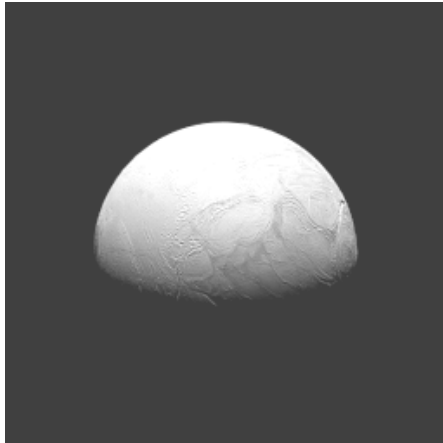
Mimas



Mass	1.8×10^{21} kg
Atmosphere present?	No
Orbital Radius	1.98×10^5 km
Orbital Period	1 D 1 H
Dominant organization	PU Mimas

As host of one of the first science outposts, Mimas is home to the 'Politeknika Universitato Mimas' or PUM. PUM was the sole higher education and therefore responsible to train all medical, engineering, and administrative staff born on Saturn. As this monopoly within a monopoly, PUMs influence is enormous. As the only major institution left on Mimas after the abandonment of GK, PUM quickly took over the planet and established an improvised government out of its existing university administration. Research previously dedicated to scientific questions of Saturn and theoretical engineering research has been halted to ensure long-term supply of life support and medical equipment. There is still a lot of knowledge and skill on Mimas, which is essential to building more advanced technologies.

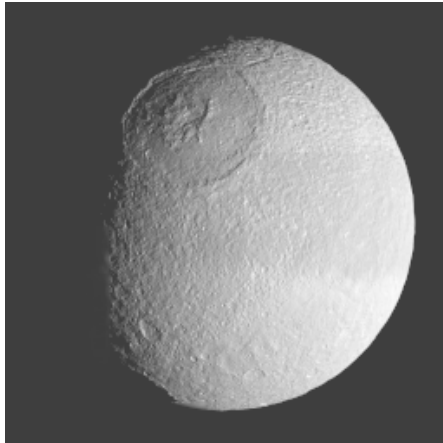
Enceladus



Mass	1.8×10^{21} kg
Atmosphere present?	No
Orbital Radius	2.38×10^5 km
Orbital Period	1 D 8 H
Dominant organization	Abandoned

Enceladus used to be home of a larger shipyard. The docks are still visible from orbit. 5 Large holes in the ice, surrounded by some small surface buildings. The majority of the complex is subterranean: workshops, storage, offices, residential areas. All powered by Enceladus's large tidal heating.

Tethys



Mass	6.17×10^{21} kg
Atmosphere present?	No
Orbital Radius	2.95×10^5 km
Orbital Period	1 D 21 H
Dominant organization	THADCON

As the sole destination of interplanetary shipping, Tethys quickly became the de-facto centerpoint for Saturn-based logistics. Due to its central location and cheap access to, surrounding moons, Generala Kosmonautiko set up their local offices around Tethys and made and central to all logistics and trade in the system. For this reason, even after their abandonment, the population remaining had enough resources and infrastructure to not only survive, but expand and break the isolation to other planets.

Dione



Mass	1.1×10^{21} kg
Atmosphere present?	No
Orbital Radius	3.78×10^5 km
Orbital Period	2 D 17 H
Dominant organization	Unsettled

Despite being one of the major moons, Dione was never really settled. The exact decisions were never fully disclosed. Maybe the upfront costs of another colony weren't worth it?

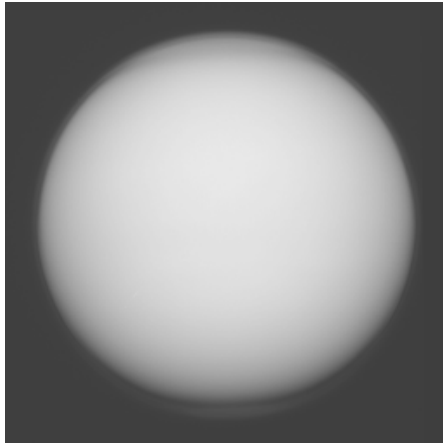
Rhea



Mass	6.17×10^{21} kg
Atmosphere present?	No
Orbital Radius	5.27×10^5 km
Orbital Period	4 D 12 H
Dominant organization	THADCON

Rhea has always been the resource well of the System, as a significant part of the surface is composed of rocks instead of being purely ice. Large queries span the rock-rich environment of Rhea to extract large amounts of rock that can be used for either surface construction or to gain metal ores. There are still some people around that can run these facilities and agreed to sell us a good amount of rock.

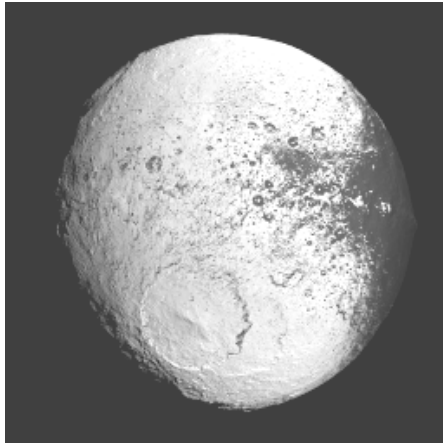
Titan



Mass	1.35×10^{24} kg
Atmosphere present?	Yes
Orbital Radius	1.22×10^6 km
Orbital Period	15 D 22 H
Dominant organization	The Brotherhood

By far the largest of Saturn's Moons and the arguably the most exotic place in the solar system. Titan has a lot of physical particularities: its thick nitrogen atmosphere, its active weather, but was initially surprisingly unimportant in the development of the colony. When people started to strive for self-sufficiency in light of GKs imminent abandonment, the so-called Brotherhood, lead by a rich iranian family hoping to build their own empire on the frontier. Their current leader is an eccentric young man believing himself to be an ancient persian king and not much is known about their actual society. They are, however, generally hospitable to us and open to trade carbon.

Iapetus



Mass	1.47×10^{22} kg
Atmosphere present?	No
Orbital Radius	3.56×10^6 km
Orbital Period	79 D 8 H
Dominant organization	KROMZZAKA SSUZONIKUXA

The Martian Government (or KROMZZAKA SSUZONIKUXA) needs no introduction. It is known that their long-term goal is to control the outer planets and make them profitable vassals for resource extraction. They have held onto Iapetus since the early days of the GK colony and turned it into a sizable outpost. It can service and refuel a small fleet and has a small military complement of its own. After the abandonment, they are still seeking diplomatic means to gain power and influence, but who knows when they will resort to more direct means.

Phoebe



Mass	8.31×10^{18} kg
Atmosphere present?	No
Orbital Radius	1.29×10^7 km
Orbital Period	548 D 22 H
Dominant organization	Abandoned

Most likely a captured asteroid, this small moonlet has its own odd orbit far away from the human activity in the rest of the System. There used to be a telescope complex here, used for both scientific and military intelligence purposes. The place has been abandoned when official support for the rest of the colony waned.