FAR HORIZON

A TL9 EXPLORATION SHIP FOR THE CEPHEUS ENGINE

COMPLETE WITH AN ADVENTURE
SET IN THE KUIPER BELT

ZOZER

Cepheus Engine — Compatible —

A Near Future Mission and Spacecraft for Cepheus Engine

Every horizon, upon being reached, reveals another beckoning in the distance. Always, I am on the threshold.

W. Eugene Smith, early 20th century photographer

Far Horizon, Zozer Games 2016
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<INCOMING MESSAGE>
--- Scott. Pass on my congratulations to the crew of the Far Horizon. Pity Pluto lost its status as a planet, otherwise your landings on the surface would have made a bigger splash in the media here ---

---Prepare for a mission change--- The IAS has noticed perturbations in the trajectory of that rogue planet, Tartarus, spotted passing through the Kuiper Belt a couple of years ago---

---Could be a vulcanism, earthquakes or even that little moon it has---

---Get your crew together, Scott. Tartarus is a fast mover, you will have only a 4 day rendezvous., but it will add an extra year to your mission---

---Tell them they are going to be the first humans ever to land on a planet outside of our Solar System. If Mankind can't get to exotic planets around alien stars, who cares? One of those exotic planets just came to us---

--Godspeed---

<MESSAGE ENDS>

Far Horizon is a science fiction adventure and spaceship book for Cepheus Engine and for the Classic 2D6 SF roleplaying game that is based on. What is more, the scenario is set close to home, both in time and space. It is 2100 AD and the Earth's Space Development Agency has funded a mission to the outer edge of the Solar System. Pluto and Charon have been explored and human landings have been made for the first time. Now the crew has taken on a new mission to explore Tartarus, a minor planet billions of kilometres from the Sun, one that is a rogue and not native to our Solar System. Tartarus is a passing interstellar traveller and Earth wants the crew of the Far Horizons to be the first humans ever to land on such a mysterious 'rogue world'. Its irregular trajectory has the scientists on Earth puzzled – and there's nothing like getting humans on to the surface to solve a puzzle!

This is a scenario that is based, for the most part, on hard science, the Far Horizon is a nuclear thermal rocket, built around a nuclear fission reactor and relying for its internal gravity on rotating spin sections. Further rules and the full background setting for this scenario can be found in the companion Zozer Games book called **ORBITAL 2100** (available from **DriveThruRPG**). However, that book is not necessary for this adventure to be successfully played out. In this book are all the resources, setting material, rules and equipment needed to play out this deep space mission:

- For referees without a copy of **Orbital 2100**, twelve pregenerated characters are provided, each one a competent and skilled astronaut.
- The exploratory spacecraft, the DRV Far Horizon, is described in detail and illustrated with comprehensive deckplans.
- Rules for operating this pre-Stellar spacecraft are also provided.
- Tartarus, its dangers and its secrets, are fully explained.
- Events and situations to challenge the player characters are presented for the referee.
- The format of the scenario is based around a realistic mission of scientific exploration.

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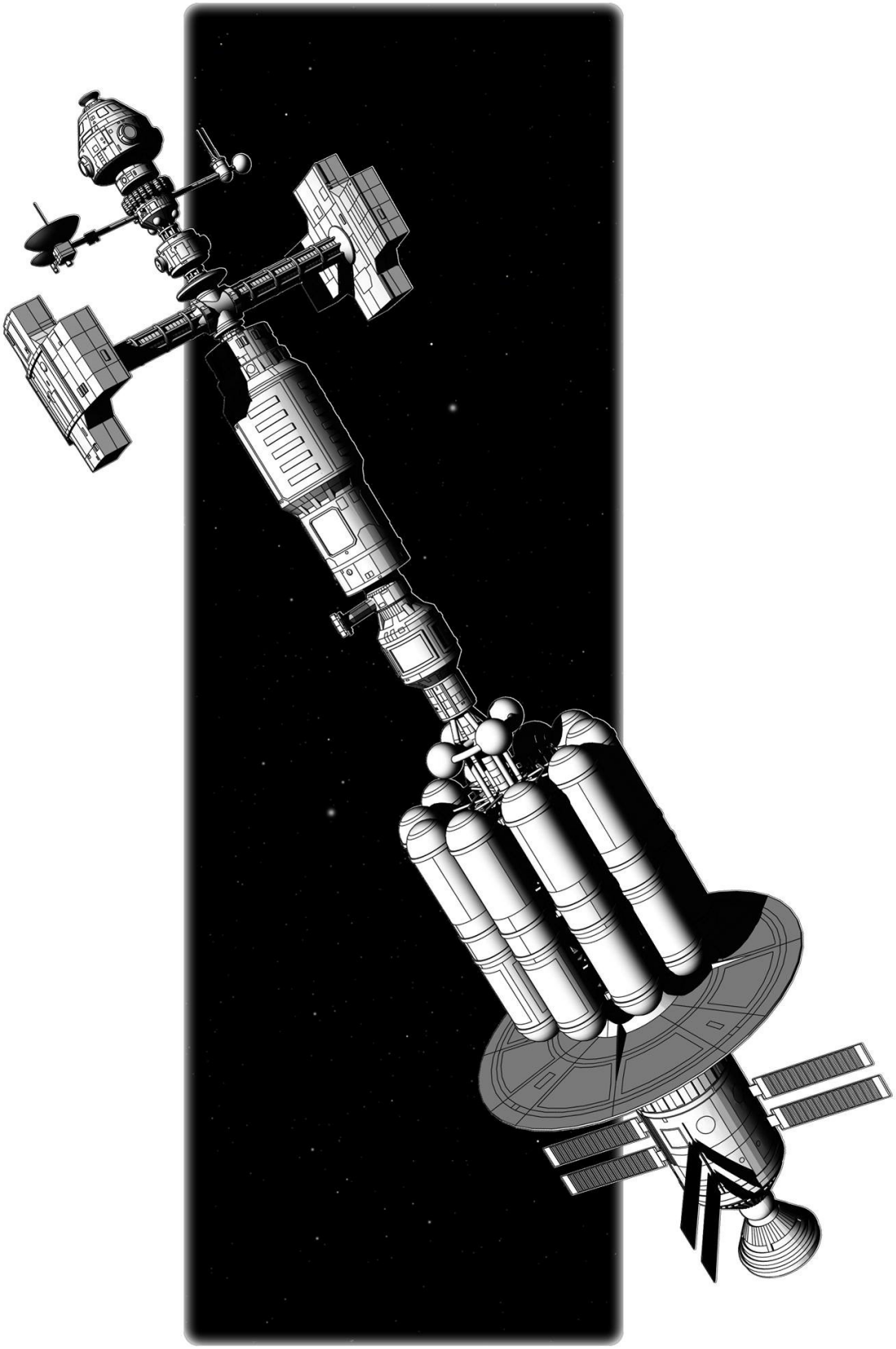
PROJECT ORPHEUS

Five years ago, in 2095, astronomers at the Bernard Lovell Observatory in geostationary orbit around the Earth spotted a new planet on the fringes of our Solar System. The International Astronomical Union was contacted, and the world officially named as 669844 Tartarus. At first it was thought that Tartarus was simply another Kuiper Belt object, but within weeks, however, it was established that the planet was not actually in orbit around the Sun. It was instead some kind of interstellar 'wanderer' – a rogue world. Such rogue worlds had been postulated, and three had previously been located in the vast empty gulfs between the stars. This was the first rogue planet that lay close enough to be visited, however. Tiny, almost imperceptible, shifts in the planet's trajectory were also noticed, these shifts were infrequent, seemingly random and extremely small, further increasing the mystery that surrounded this rogue planet. What was causing the trajectory anomalies: Extreme volcanism? Major earthquakes? The influence of Tartarus's little rocky moon?

The Earth Space Development Agency (ESDA) proposed a manned expedition to Tartarus and its planners soon settled on the idea of assigning the new rogue planet as a target world for their on-going Project Orpheus. Project Orpheus had been established fifteen years ago with the stated mission of exploring Pluto and its satellite Charon, along with a number of other smaller bodies on the fringes of the Kuiper Belt. A single exploration craft, the DRV Far Horizon, was purpose-built for the project and once fitted out and training completed, the 12-strong crew spent two years in cryogenic sleep as the vehicle coasted out to Pluto. No humans had yet reached Pluto to make a landing.

A landing on both Pluto and its companion Charon, took place six months ago in 2099. There was little of the kudos of landing on Mars or Titan or Venus. By now, Pluto's once illustrious status as a planet had been forgotten, it was merely just another dwarf planet on the icy edge of the Solar System. Project Orpheus had broken several records for manned spaceflight: Orpheus had truly entered the Underworld, a place where no mortal had ever trod. There were other targets to now consider, a comet and a particularly interesting 'cluster' of fast-moving asteroids, but ESDA contacted Far Horizon with its new and far more interesting target – 669844 Tartarus. It would require a journey of six months in order to reach the rogue planet and it would add another year to the mission length, putting the crew of twelve even further beyond the realm of Mankind. No-one could ever help the Far Horizon, should some calamity befall her. The crew held a meeting to discuss the proposal and it unanimously agreed to the change in Far Horizon's flight plan. They were going to be the first humans ever to land on a planet outside of our Solar System. If Mankind could not get to exotic planets around alien stars, it did not matter, for one of those exotic planets had come to Mankind!



FOR THE REFEREE

Far Horizon is a science fiction scenario that puts the player characters on to a distant alien planet that is passing by our Solar System. There is little outside communication (the one-way radio time lag to the planet Tartarus, from Earth, is 5 hours) and no help of rescue or physical assistance. The crew have travelled for two years to get to Pluto and another six months to reach Tartarus. This rogue planet is moving at a terrific speed and Earth has given them only a four day window of exploration before they MUST initiate a de-orbit burn to bring them back into the inner solar system. Every hour they delay increases the chance that they will not make it back – see Getting Home. Out on the fringes of interstellar space, player characters are on their own with only the resources of their vessel to help them.

There are certain constraints on the players: it is assumed they are all scientists and technical experts, all crew on board the Far Horizon; it is assumed the crew will work toward the fundamental aims of the mission – the exploration of this rogue planet; it is also assumed that they will work as a team and not attempt to sabotage or interfere with one another's actions. The scenario, just like **Orbital 2100**, is hard SF (or as hard as it can be!) but it includes elements of science fiction that include alien life.

What is Tartarus?
Tartarus was one of several worlds orbiting the star Tau Ceti that was once inhabited by a technologically advanced alien race. Experiments to create a star-drive on the planet went awry and Tartarus was rudely ejected from its orbit to begin a high-speed journey through the cosmos, passing by the Solar System on its way. All life on Tartarus was soon wiped out as eternal darkness and cold gripped the little world. Much of the ocean froze, the atmosphere froze and the alien colony and the star-drive technology it was constructing, froze too.

What Will the Players Find?
Although expecting to find a world similar to Pluto, Tartarus is Mars-sized with obvious signs of once being terrestrial and rocky, rather than an ice-ball. It will be obvious that there was once a breathable atmosphere, and that the ocean might still exist beneath the ice. The planet seems to be geologically active, still. Red staining at star-shaped cracks in the ice might suggest life in the ocean. Likewise tall skyscraper-like structures can be seen dotted in one area – is this a city? A radar scan also indicates symmetrical shapes under the ice, but are they natural or manufactured? The players must send down a lander, either to check out the shapes under the ice, the skyscrapers or to send a probe through the ocean pack-ice.

The players will ultimately discover the fate of Tartarus and the fate of the aliens who lived there. There is bacteria in the oceans and on land but nothing more. The skyscrapers are not artificial, but monstrous ice fumaroles, chimneys created where venting steam is frozen in mid-air. The under-ice structures, however, ***are*** artificial and represent the remains of alien buildings used to house various parts of the star drive project. Here an artificially intelligent alien computer continues to function. It attempts to communicate with the Far Horizon's own shipboard mainframe (CASS) believing it to be a rescue craft from Tau Ceti. When there is no intelligible response from CASS, the AI assumes the spacecraft belongs to a hostile force and attempts to once again initiate the star-drive, but it does not work as intended and only shifts Tartarus a few hundred metres, enough, however, to threaten danger to all of the humans.

In the end, the crew should hopefully come away from Tartarus alive, with two or three locations studied and recorded. They might also piece together the history of the planet and the icing on the cake would be the recovery of an inert miniature prototype of the stardrive for study by Earth's engineers. The fact that it does not actually work should not lessen the enthusiasm and gratitude of those engineers.

What Are the Complications?

The science investigation is just a setting for the story, the real adventure involves the obstacles, difficulties and technical problems the team will endure. The main complications are:

1 The lander may be hit by a geyser of steam venting from the ice, as it makes its final descent. This could cause damage.
2 As they discovered on Pluto, the team must expect the retro-rocket to melt the surface ice a little, which will refreeze and 'stick' the lander to the surface. A good deal of work with ice picks and shovels will be needed to free the lander before lift-off.
3 There will be a random suit malfunction, keeping the players on their toes.
4 A surviving alien AI computer will begin trying to communicate with the DRV Far Horizon, inadvertently causing it to malfunction.
5 The single small moon of Tartarus drags around a cloud of micrometeoroids and the Far Horizon detection system will alert the crew to the danger. They will have 4 minutes before both DRV and personnel on the surface will face a shotgun blast of these deadly, but minute, particles.
6 The star drive activates at the command of the alien AI, but it malfunctions and moves the planet hundreds of metres, causing earth/ice-quakes and destabilizing the orbit of the Far Horizon, plunging it into a rapid orbital decay. Both humans on the surface and on the Far Horizon are in great peril.

Organizing the Players

Action in this scenario occurs both in orbit on-board the Far Horizon and on the surface of Tartarus. Since someone must be left on-board to run the spacecraft anyway, it is recommended that all players take two characters, one of which will board the lander and go down to the surface, the other which will remain on the Far Horizon. This way there will be two groups and all players will have a stake in, and a say in, the actions and events that take place in orbit or on the ground. You may have six players, in which case the crew complement is perfectly suited to your group. If there are less than six, then those spare characters should be kept on tap as replacements. Inevitably there will be one or two (or more, who can tell…?) deaths. The Palomino landing craft can hold eight people, and so a full complement of six characters should make the journey down to the surface, any extra 'bodies' should be used as NPCs and controlled by the referee until they are needed as replacement player characters.

DRV FAR HORIZON

The Far Horizon was built three years ago, but was conceived much earlier as part of Project Orpheus. Despite the fact that the craft is comparatively large (1000 tons) compared to many other DRVs, its crew is modest. This is in part due to the need to reduce life support costs, and the need for ever larger hydroponics facilities. Mission times were envisaged to be several years at least. From a roleplaying stand-point, a small crew can be handled more effectively by the players themselves and there are always a limited number of hands available. Contrast that with a crew of twenty or thirty, where there would always be someone to jump in and help out (or even outrank) the player characters. So, Far Horizon is a big ship with a small, highly trained, crew. The slim complement of only three scientists is a little misleading, however. These three individuals are experts in their fields and can be seen as project managers. All of the other crewmembers also have scientific training in astronomy and planetology which accounts for their relatively high Education scores. The Apollo astronauts were not just pilots, but engineers and trained geologists. One Apollo crew in training was taken on a field trip to study a desert outcrop by a geologist who had studied it all his life. The (student) astronauts were actually able to re-interpret the site and come up with a new theory regarding its formation.

Voroncovo DRV Far Horizon

Using a 1000 ton self-sealing hull, the Far Horizon is a deep space exploration and research craft designed specifically for long duration mission out towards the Kuiper Belt. It has a nuclear thermal rocket-R and powerplant-R giving a delta-V of 95 km/s. Fuel tankage of 440 tons allows for a full thrust voyage and includes a 40 ton reserve for use by the small craft carried on board. Ten tons of fuel processors and a flare damper are fitted. Adjacent to the bridge is a Model/2 computer and a suite of advanced sensors. A pair of rotating arms mount spin pods that carry, between them, twelve single bunk staterooms and a lounge, twelve cryogenic low berths, a briefing room, storm shelter, hydroponics farm (which provides all life support needs), three laboratories and a dedicated medlab.

Other facilities on board include 20 probe drones, 20 tons of mining drones, and a set of repair drones. There is a workshop and a docking clamp mounted forwards that allows the Far Horizon to attach itself to another vehicle up to 2000 tons and manoeuvre as normally. Ancillary craft carried aboard the exploration vehicle include one 20 ton Long Beach shuttle and two 10 ton Palomino landing craft. Each lander is capable of carrying six crewman to the surface of a moon or asteroid. Cargo capacity is 60.2 tons.

The Far Horizon requires a crew of twelve: pilot-commander, pilot, senior mission specialist, two mission specialists, navigator, medical technician, hydroponics specialist, chief engineer, second engineer (reactor specialist), third engineer (life support specialist) and fourth engineer (ancillary craft and hanger specialist). The vehicle costs MCr 728.87 and takes 108 weeks to construct.

Name:	Voroncovo DRV 'Far Horizon'		Tons	Cost
Hull Size	1000 Dtons	20 Structure	1000	100
Airlocks	4 included			
Self-Sealing	Yes		50	200
Engineering Section			-	-
NTR	R	Delta-V 95 km/s	85	160
P-Plant	R		98	196
Fuel	400 tons		400	-
Reserve Fuel			40	-
Flare Damper			1	1
Control Section			-	-
Bridge			20	5
Computer	Model/2		-	0.16
Electronics			-	-
Advanced Sensors			3	2
Equipment Section			-	-
Cargo Hold	60.2 tons		60.2	-
Drones: Repair			10	2
Drones: Probe	20		4	2
Drones: Mining	2		20	2
Fuel Processors	100 Tons/Day		10	0.5
Ships Locker			-	-
Vehicle Hangar	40		12	10.4
	Palomino (10 tons) x 2		20	12.87
	Long Beach (20 tons) x1		20	6.76
Workshop			8	4
Docking Clamp	2000 tons capacity		20	4
Living Section				
Briefing Room			4	0.5
Staterooms	12		48	6
Low Berths	12		6	0.6
Storm Shelters	1.5 (enough for 12)		6	1.5
Hydroponics: Farm	12 Person		24	6
Medlab: Dedicated			8	1.5
Laboratory	3		12	3
Spin Gravity: Spin Capsules	Equipment Under Spin:		10.8	1.08
		Totals	***999.8***	***728.87***

Bartikovsky Gives Us A Tour

Name	Far Horizon
IAU Registration	0778472
Type	Deep Space Research Vehicle
Manufacturer	Voroncovo, Russia
Date Laid Down	13 July 2095
Date Completed	16th August 2097
First Flight	28th December 2097
Powerplant	Nortinghouse D3N-B 100 MW trimodal fast-spectrum beryllium-reflected CERMET-fueled Nuclear Reactor.
Propulsion	Nortinghouse N1200 - Thrust 38,000 kg (333,600 Newtons) at a nominal ISP (specific impulse) of 944 seconds.
Cooling System	Brayton RD-12 Radiators
Computer System	CASS-3G Cybernetic Augmented Synaptic System
Length	34m
Displacement	1000 dtons/1500 m³
Sensors	Okuda Technics Science Array

Welcome to the Far Horizon, we are docked in geosynchronous orbit around Earth at Marco Polo High Port. Jason Bartikovsky, one of the spacecraft's engineers, is about to conduct a short tour of this newly completed research and exploration craft. He wears the grey one-piece flight suit issued to all crew-members, his square mission patch clearly visible on his shoulder. Currently we are floating in a zero-G loading bay aboard the Marco Polo, filled with supply cases, scientific instruments, equipment for the lockers and so on. The hatch is open and we follow Bartikovsky through a short tunnel (the forward airlock of the Far Horizon, 'A-Lock'). A second hatch, locked open at the moment allows us to drop gracefully into the command section. Straight away the noise hits us, a large number of displays are mounted into workstations, and all of this electrical equipment has to be cooled. The noisy fans of the ventilation system are constant, and resemble similar systems on the cockpits of modern airliners. The four consoles face the walls at regular intervals. It is dim here, lit mainly be the screens and digital read-outs. Bartikovsky sits in the pilot's seat and straps in with a five-point harness, then he shows how the entire seat can flip 90 degrees to face the 'ceiling' for periods of acceleration. The four couches are typically used by the two pilots, the navigator and either the chief engineer or the senior mission specialist, depending on the phase of the flight.

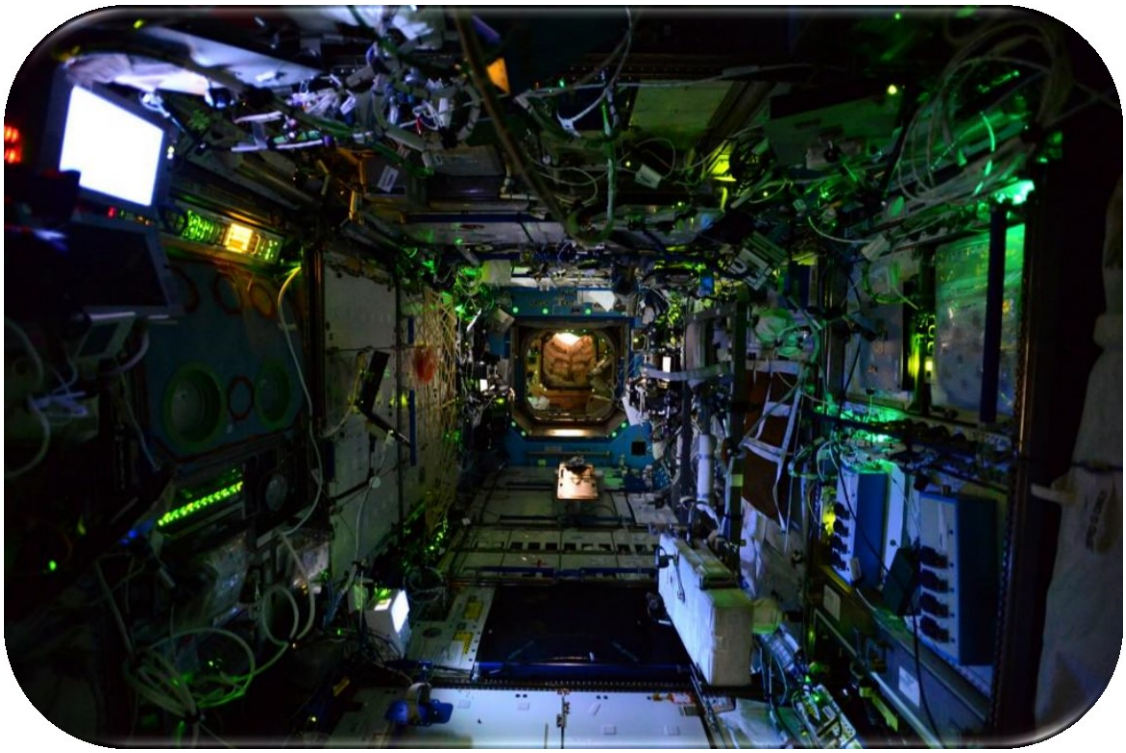
There is quite a bit of space around a second hatch dropping through the floor in the middle of the command deck, mainly to give people and equipment space to move as they come through the forward airlock for the first time. Passing through this hatch in the floor we emerge into the 'second deck' as it is known, used by the navigator for plotting trajectories with a large 3D display table. Dominating this deck are the cupolas, great windows or glazed blisters set at four equidistant points around the walls to provide unrivalled views out into space. There are video and still cameras here in racks, and loops on the floor for feet, to prevent observers from drifting away from the cupolas.

Access to the mainframe, known as CASS, is gained from a computer station behind the navigator's plotting table. Major programming and systems maintenance is done at this desk. Between two of the cupolas is a fresher with drinking water, toilet and washing facilities. Note all of the kit racks and supply bags that are fastened to the walls and ceiling with webbing. The stuff is stowed where-ever there is a free space!

Hatches in the centre of each deck connect them together, and Bartikovsky leads us down through short cylindrical tunnel covered in hatches and digital displays. These are the

environmental controls and our guide is responsible for regular monitoring and adjustment of them. The roaring and wheezing of the air con is dull and enclosed in here. We pass on through the next hatch into a cramped control deck, from where a mission specialist sits at the console in front of us to launch and monitor probes that are packed in racks on to the outside of this ship section. Behind the console on the other side of the hatch are the communications and sensor systems, from here sensors can be calibrated, diagnosed and controlled.

Dropping through the next hatch we pass into the EVA room. Here two sets of suit racks are mounted opposite one another on the walls. To left and right are the two airlocks on this deck; 'Lock-B1' and 'Lock-B2'. Both locks are covered in alarming emergency decals, and detailed instructions are printed on the wall nearby. This area is brightly lit. In the roof space are tool and equipment lockers, filled with the kit required when conducting EVAs outside the spacecraft.



Now we move on down, into a rotating cylindrical section. A hatch below us would allow us to continue our journey down the Far Horizon, but we are fascinated instead by two tunnels that lead off in opposing directions; the entrance to these tunnels spins continually. Using handrails on the wall, you follow Bartikovsky and pull yourself into one of the tunnels, steading yourself as you feel the motion of the long tunnel against your body. These tunnels lead to the sleeping quarters and accommodation decks that are usually kept in half-Earth gravity.

As we descend, gravity begins to pull you toward the bottom faster and faster. Bartikovsky tells to grab a 'runner', a long chain of hand loops that runs continually along the length of the tunnel. Grabbing a runner you descend at the rate it travels and are able to land gently in the centre of a common room. It's all brand new and clean, with easy chairs, tables and sofa. In one corner is a galley, made of polished aluminium, lockers packed with ration bags cover the low ceiling of the lounge. All are numbered and coded, when you run out of

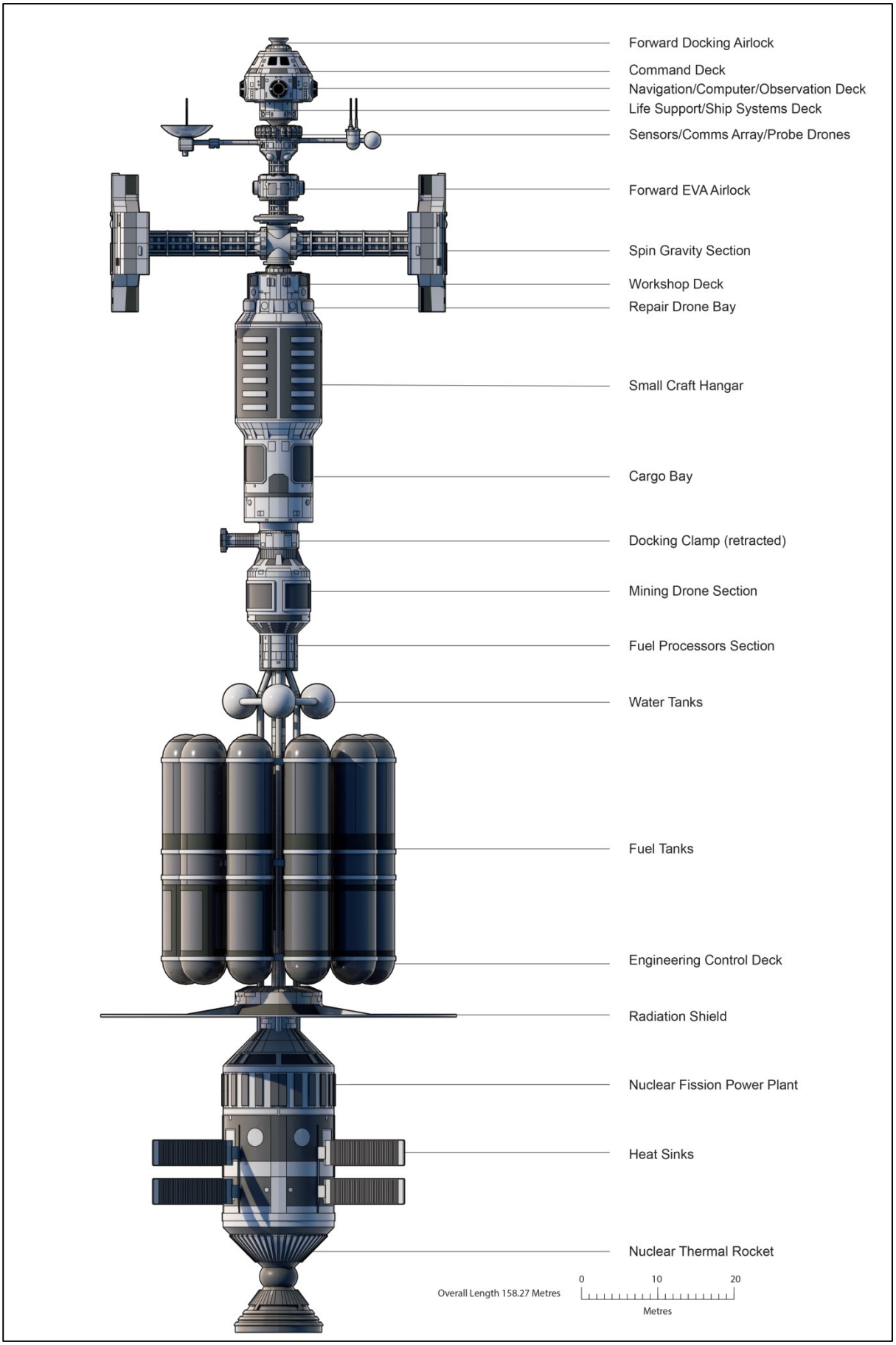
tabasco, you need to know where the replacement is! Lighting here is subdued and gentle and the half gravity is very comfortable. A large curved screen in one corner functions as an entertainment centre.
The four walls all have a corridor leading away to private sleeping quarters. You now notice that the floor is gently curved, with the corridors to left and right leading both 'out' and 'up and away' from the lounge. Bartikovsky shows you his room, with a bed, desk and chair and private lockers. It is only 3m square, but that's easily enough, he says. He might not be saying that in two years' time, you think! He also points out various doors leading to freshers, to the briefing room where mission briefings or debriefs can be given, the three rows of chairs facing an interactive wall screen. Bartikovsky doesn't linger at the storm shelter, but activates the door so you can look in – the lights come on when there pick up your motion. It's a place to shelter during cosmic storms where radiation can be a killer. Here, behind the walls are tanks holding drinking water, providing the defence needed. The room has fold out chairs and tables, and gym equipment bolted to the floor. "It will be used by the crew for exercise, private meetings, or just to get away from other folks in the lounge, or the rest of the ship.

Passing back up the tunnel (this time holding on to runners that take you back to the centre of the spacecraft) you and Bartikovsky drop into a corridor. Two large doors on the left have glazed windows through which you can see into the hydroponics bay. It's called hydroponics, and some of the plants are grown in water, but soil is used to. Planting beds arranged in staggered racks are already lush and overgrown. There are three labs on this deck, and your guide shows you into one of those, set up for geological analysis. At the end of the long corridor off to the right is the medlab, beds lay crisp and unused, and on the other side of the room is fitted diagnostic equipment, a portable MRI scanner, X-Ray

machine and other kit. The medics workstation, with imaging software sits nearby. Lockers filled with medical supplies and pharmaceuticals cover the walls. A door in one wall leads to the cryogenic units, used for the long flight out to Pluto and in case of emergency. They are arranged in two rows, facing one another, umbilicals and electrical cables lead up from each unit into overhead machinery.

Back at the centre of the craft, you leave the rotating tunnels above you and instead descend into the workshop section, packed with tool lockers, spare-parts racks and testing and fabrication benches. The section is cramped. You move on, past a door leading into the repair drone bay. Bartikovsky does not stop here though, but tells you that a workstation there is used to operate and monitor the three EVA drones capable of various types of in-flight repair. The drones leave the section via two large double doors opening out in to space.

Next is the hangar deck, but to reach the deck you first you must pass through a door in the central shaft. This acts as an airlock and opens out onto the circular hangar bay. This is an impressive 12 metres tall. Here the two Palomino lands sit is muted darkness, waiting for their chance to drop to Pluto's surface. In a cradle hanging from the 'ceiling' between the two landing craft is mounted the Long Beach shuttle, used for excursions away from moons or planets. Tool boxes are mounted on the walls, along with inspection lights and spare parts etc. Refuelling hoses and pressure pumps are built into the floors, near each vehicle. A control panel near the airlock allows the craft to be rotated, the bay to be fully depressurized (wear a suit!) and the outer bay doors to be opened. It also allows various systems on board the vehicles to be initiated and kick-started without having to climb on board.


Forward Docking Airlock
Command Deck
Navigation/Computer/Observation Deck
Life Support/Ship Systems Deck
Sensors/Comms Array/Probe Drones
Forward EVA Airlock
Spin Gravity Section
Workshop Deck
Repair Drone Bay
Small Craft Hangar
Cargo Bay
Docking Clamp (retracted)
Mining Drone Section
Fuel Processors Section
Water Tanks
Fuel Tanks
Engineering Control Deck
Radiation Shield
Nuclear Fission Power Plant
Heat Sinks
Nuclear Thermal Rocket
Overall Length 158.27 Metres
0
10
20
Metres

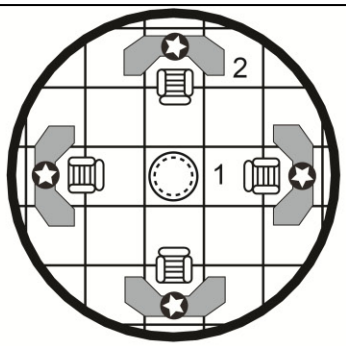
Back in the main shaft we descend into the cylindrical cargo bay, also 12m in length. It is essentially just a mass of white supply packs, equipment bags and storage units all webbed together. Everything is colour-coded and numbered to allow for (relatively) quick location of

needed supplies. There is just enough space through the centre to squeeze through to the next deck.

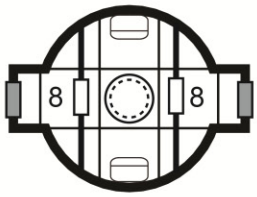
The next stop is a small deck with an airlock (C-Lock) in one wall. There are other controls and read-outs here, too, and Bartikovsky tells you that the airlock is part of a docking clamp which can be extended out from here to connect with another spacecraft or a spacestation. The concertinaed, geodetic design provides formidable strength, even when the airlock tunnel is extended out to the host ship.

Bartikovsky tells you that you are both about to enter the engineering section, the parts that are safe for humans, at least. First you pass a door in the shaft leading to another drone bay, this time the mining drone section. The shaft drops for an incredible 42 metres past an array of fuel monitoring stations, the controls for the fuel processors and the vast hydrogen fuel tanks which are located all around this part of the central shaft. Finally, you descend to the very bottom of the Far Horizon, into the engineering control deck. An array of digital readings and monitor screens are located against the walls, and large fuel system pipes pass through the deck. It is from here that the nuclear fission reactor is controlled and monitored, behind several thick layers of shielding underneath you. You cannot go any further without being irradiated. Opposite the main reactor panel is the engineer's airlock, or the aft airlock (D-Lock). From here engineers or others can conduct EVAs at the rear of Far Horizon, protected from the dangers of radiation once in space, by a large circular shield hiding both the reactor and it's wing-like radiators as well as the nuclear thermal that sits at the very base of the spacecraft. For repairs to this section, bathed in gamma radiation, the repair drones will have to be used.
Now the tour is over and we sweep up through the central shaft, past all of the hatches which were conveniently left open (as they are in orbit, while coasting or docked). The trip back to the command deck at A-Lock takes five minutes. We bid engineer Bartikovsky goodbye and wish him well on his record-breaking voyage to Pluto, may he and his crewmates be successful in achieving the most furthermost landing of any human in the Solar System.

<TO VIEW A VIDEO TOUR OF FAR HORIZON, CHECK OUT Jason Bartikovsky's WEBSITE at www.esda.far-horizon.bartikovsky.ac>

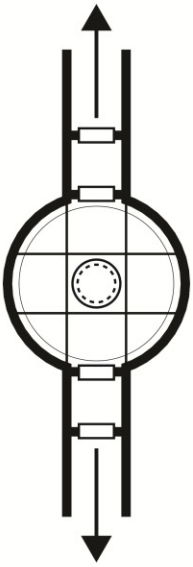


Command

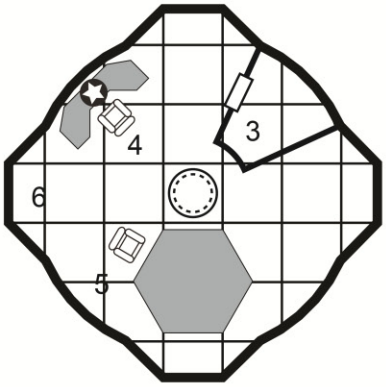


Forward EVA Airlocks

15 m tube to Spin Pod

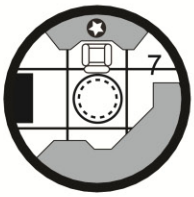


Spin Section Access and Machinery



Navigation/Computer/Observation Deck

Life Support/Ship Systems Deck

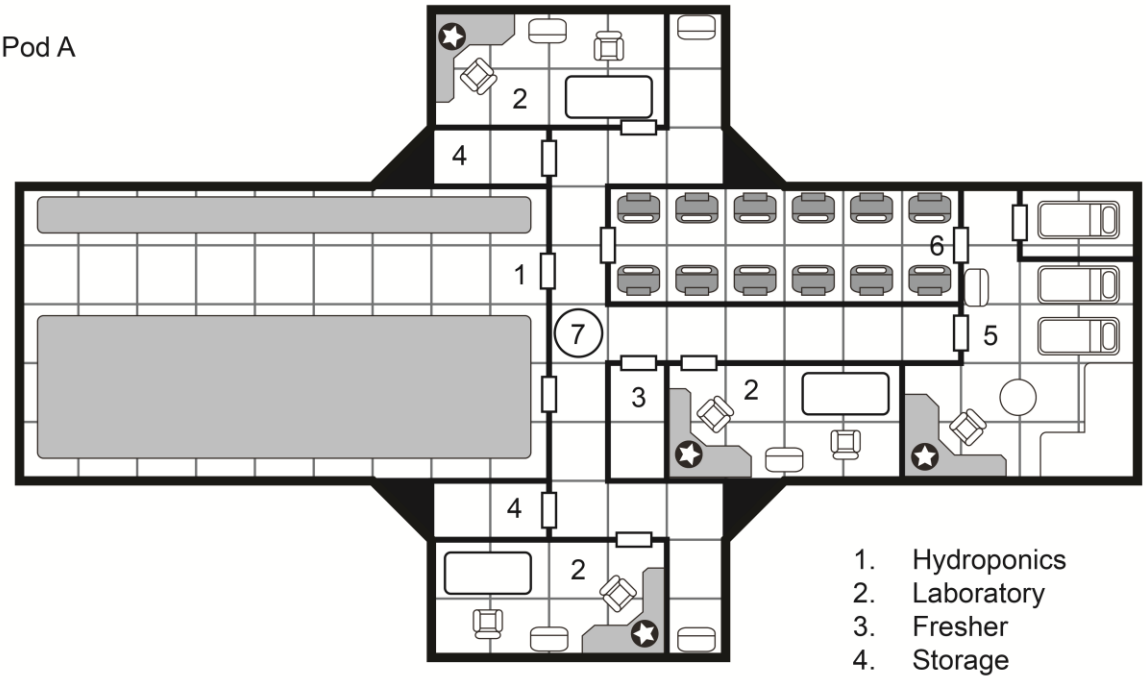


Sensors/Comms Array/Probe Dones

1. Deck Access & Forward Airlock
2. Crew Stations x4
3. Fresher
4. Ships Computer Control Access
5. Nav Table
6. Observation Blister x4
7. Probe/Sensor Workstation
8. Airlock

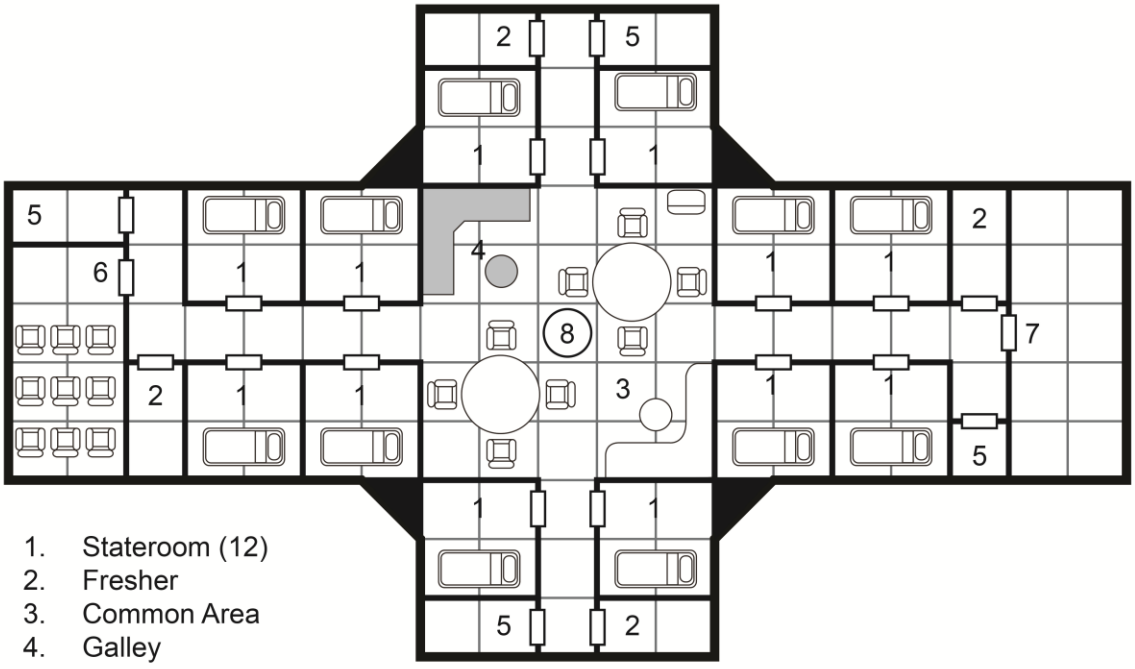
Far Horizon Deck Plans
Spin Gravity Habitation Pods

Pod A

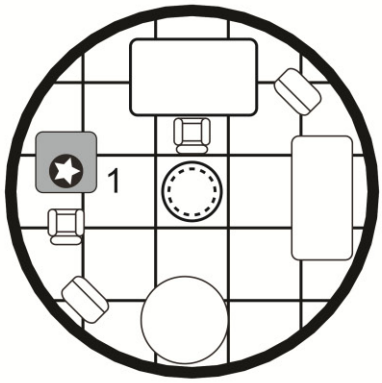


1. Hydroponics
2. Laboratory
3. Fresher
4. Storage
5. Medlab
6. Low Berths (12)
7. Spin Arm Access

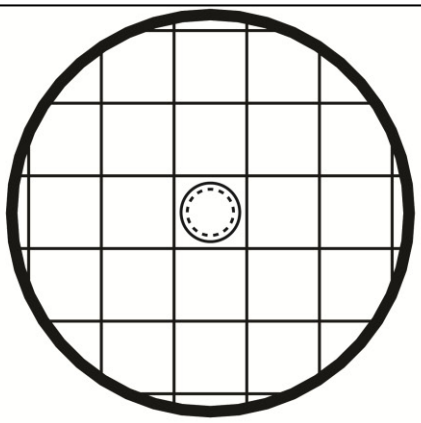
Pod B



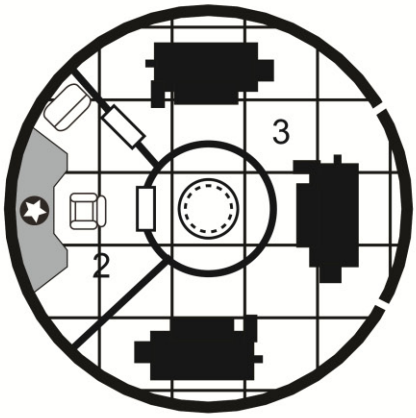
1. Stateroom (12)
2. Fresher
3. Common Area
4. Galley
5. Storage
6. Briefing Room
7. Storm Shelter
8. Spin Arm Access



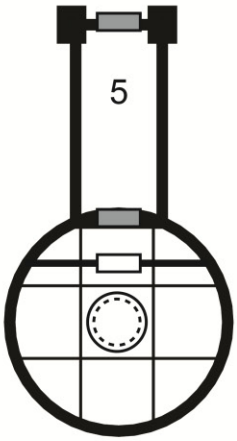
Workshop Deck



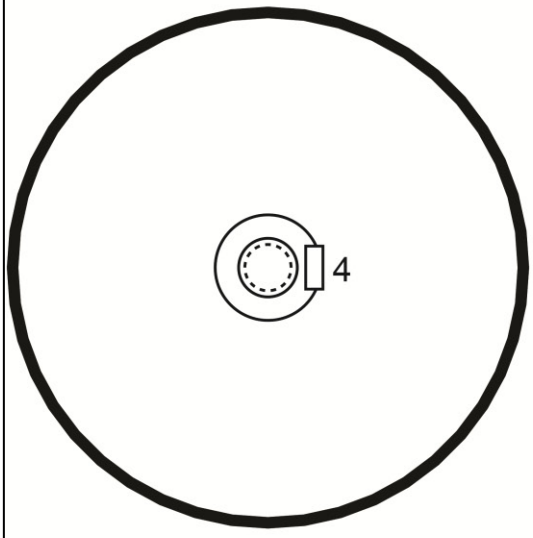
Cargo Bay
(12m High)



Repair Drone Deck



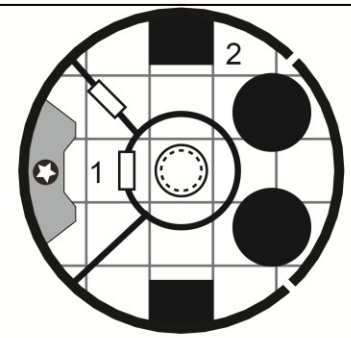
Docking Clamp



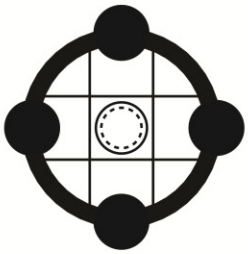
Small Craft Hangar
(12 Meters High open space)

1. Workshop Workstation
2. Drone Control Station
3. Drone Bay
4. Hangar Access Tube
5. Airlock

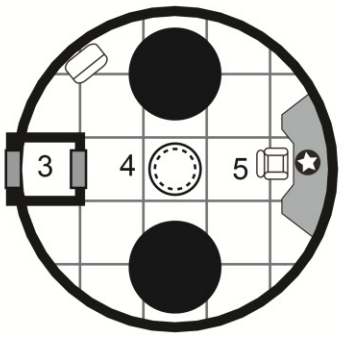
A 12m tube runs through the hangar.
Craft access point is from tube



Mining Drone Section
(6m high deck)



Fuel Processors
(6m high deck)



Engineering Control Deck

Deck Plan Key

- Bed
- Chairs
- Locker
- Normal Door
- Outer Hatch
- Ceiling & Floor hatch
- Console
- Fresher
- Average Human to scale

1 square = 1.5 metres

1. Drone Workstation
2. Mining Drones
3. Airlock
4. Access to Power/Engine Crawlspace
5. Engineering Workstation

AUXILIARY CRAFT

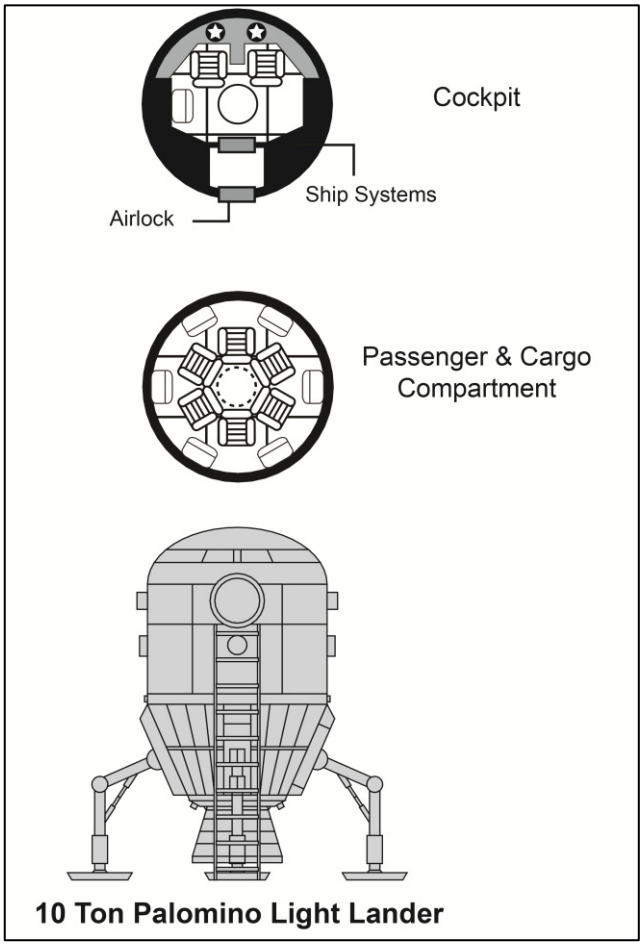
The Far Horizon has two Palomino Landers, designated HL-562 CLARION and HL-563 ECHO.

Palomino Heavy Lander (HL)

The Palomino is used to ferry passengers to a world surface from a DSV, or to cross from a Lagrange station to the Moon.

Using a 10-ton hull, the heavy lander is capable of 3 burns, carries 1.5 tons of fuel and has a crew of two. It is fitted with an airlock, landing suspension and chemical batteries that provide 40 days of power.

The craft has a 0.54 ton cargo bay and a cabin with couches enough for 6 suited passengers. The heavy lander costs MCr6.39.



10 Ton Palomino Light Lander

Name:	Palomino Heavy Lander		Tons	Cost
Hull Size	10 Dtons		10	1.1
Airlocks	1 fitted		1	0.2
Engineering Section			-	-
M-Drive sA	2 g rating		0.25	0.5
P-Plant sA		40 Days	1.2	3
Fuel	1.5 Tons	3 Burns	1.5	-
Reserve Fuel	None		-	-
Chemical Batteries	40 Days			
Flare Damper			0.01	0.06
Control Section			-	-
Cockpit	2 Crew		0.5	0.1
Acceleration Couches	X2		1	0.1
Computer	Model/1		-	0.03
Electronics			-	-
Basic Sensors	DM-4		-	-
Equipment Section			-	-
Cargo Hold	0.54 tons		0.54	-
Passengers	6x Acceleration Couches		3	0.3
Landing Gear			1	1
		Totals	***10***	***6.39***

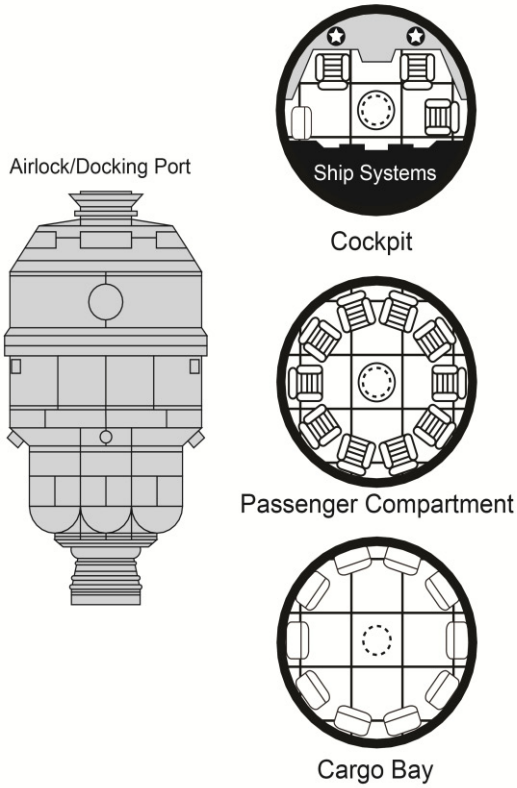
The Far Horizon has a single, custom-modified, Long Beach inter-orbit transfer shuttle, without landing or re-entry capability. It is designated TS-330 UNICORN.

Long Beach Transfer Shuttle (TS)

This vehicle is unstreamlined and spends its life in low or geostationary orbit. The Long Beach is a common orbital transporter, ferrying passengers from DSV to stations or from stations to station. It could easily carry people from planetary orbit out to the low orbit of a moon. What the Long Beach lacks is any landing or re-entry capability.

Using a 20-ton hull, the transfer shuttle is capable of 4 burns, carries 4 tons of fuel and has a crew of three (two pilots and a flight attendant). It is fitted with an airlock, solar panels as well as chemical batteries that provide 80 days of power.

The transfer shuttle has a 5.18 ton cargo bay and a cabin large enough to hold 10 passenger couches. The transfer shuttle costs MCr7.76.



20 Ton Long Beach Transfer Shuttle

Name:	Long Beach Transfer Shuttle		Tons	Cost
Hull Size	20 Dtons		20	1.2
Airlocks	1 fitted		1	0.2
Engineering Section			-	-
M-Drive sB	2 g rating		0.5	1
P-Plant sD	4 rating	80 Days	2.1	4.5
Fuel	4 Tons	4 Burns	4	-
Reserve Fuel	None		-	-
Solar Panels	40 Hours to charge batteries		0.21	0.021
Flare Damper			0.01	0.06
Control Section			-	-
Cockpit	3 Crew		0.5	0.1
Acceleration Couches	X3		1.5	0.15
Computer	Model/1		-	0.03
Electronics			-	-
Basic Sensors	DM-4		-	-
Equipment Section			-	-
Cargo Hold	5.18 tons		5.18	-
Passengers	10x Acceleration Couches		5	0.5
Landing Gear			1	1
		Totals	***20***	***7.76***

THE CREW

Official crew patch, placed on right shoulder of the flight suit.

The crew of Far Horizon is composed of professional spacers, men and women who are employed by the Earth Space Development Agency (ESDA). They are not just 'space truckers', but scientifically trained astronauts, each one driven to complete the mission. There are no back-sliders or slackers, no thieves, liars or conmen – Project Orpheus is a multi-year mission and it began with several years of training, anyone unsuitable will have been weeded out long ago. Everyone is a team player.

There is a hierarchy, there has to be on any spacecraft, but generally, seniority is based on fields of expertise rather than a military-style rank structure. This is eminently suitable for roleplaying where all the players have an equal say and a valid part to play in decision-making and mission tasks. Yes, there is a 'captain' (Lucas Adair, the command-pilot) but he will be played by a player who has no sway over the others; decisions, just as they would be on the Far Horizon, will be debated in the briefing room or on the bridge, and the most logical and popular measure will be followed. This is how rpgs work. In real life Adair would have the final say, after taking on board the comments of the relevant crewmen.

The order of seniority runs like this: the command-pilot is the mission commander and his second-in-command is Ackerman, the chief engineer. This is not by accident, the chief engineer on a modern merchant ship today holds great power and has been at sea for several decades, he or she knows the ship inside out and is able to manage his own department efficiently. The role makes a great executive officer.

Next in line of seniority according to ESDA is Kuznetsov, the chief mission specialist. She will be running the science and research and will work closely with Adair to get the objectives of the scientific mission to Tartarus completed. She has a team of two mission specialists brought on board specifically for their knowledge of rogue and dwarf planets. The flight crew (pilot, navigator and medical technician) report to Adair, whilst the three engineers and the hydroponics technician report to the chief engineer. All are of roughly equal standing. The lovely-to-watch movie Red Planet (released 2000) has the crew of Mars-1 look down on Val Kilmer's character Gallagher as 'the janitor', despite his position as the flight engineer. As on the ISS, on Far Horizon, no matter what your paycheck says or how many years you've been in the service, you and your opinion are important, otherwise the agency would not have selected you for this mission, on this ship. This kind of climate allows players to freely act, discuss and make decisions without any fear of being over-ruled or out-ranked.

Character summaries are provided here, but individual character record sheets follow. The section on appearance has been left blank for players to individualize their characters. Each player should take two crewmen, one that remains on board the Far Horizon and one that makes the descent to Tartarus.

Command-pilot Lucas Adair 778AA8 Age 46 Terms 7
Piloting 3, Admin 1, Leadership 2, Vacc Suit 2, Electronics 2, Comms 1

Pilot Sara Cheng 5589B6 Age 38 Terms 5
Piloting 3, Navigation 2, Astronomy 1, Vacc Suit 1, Comms 0

Senior Mission Specialist Vic Peterson A598C5 Age 38 Terms 5
Glaciology 2, Geomorphology 2, Vacc Suit 1, Comms 1, Mechanics 1

Mission Specialist 1 Katiya Kuznetsov 7749C7 Age 30 Terms 3
Astronomy 1, Petrology 2, Computer 1, Vacc Suit 1, Comms 0

Mission Specialist 2 Shireen Lanstrom 648AB8 Age 38 Terms 5
Survival 1, Geomorphology 1, Mechanics 2, Engineering 1, Vacc Suit 0, Comms 0

Navigator Michael Dodds 596984 Age 30 Terms 4
Navigation 2, Comms 1, Computer 2, Vacc Suit 0

Medical Technician ('the doc') Kurt Hollister 556879 Age 50 Terms 8
Medicine 3, Computer 1, Biology 2, Carousing 1, Recon 1, Gun Combat 1, Vacc Suit 1, Electronics 2, Comms 0

Hydroponics Specialist Helen McLean 774BA6 Age 34 Terms 4
Mechanics 2, Carousing 1, Vacc Suit 1

Chief Engineer Sven Ackerman 67BBB5 Age 50 Terms 8
Engineering 4, Mechanics 2, Leadership 1, Vacc Suit 1, Admin 1, Liaison 1, Gambling 1, Computer 1

Second Engineer/Reactor Bob Summerfield 996888 Age 46 Terms 7
Mechanics 3, Computer 2, Engineering 1, Piloting 1, Medicine 1, Jack-of-all-Trades 2, Vacc Suit 0

Third Engineer/Life Support Jason Bartikovsky 497793 Age 30 Terms 3
Computer 1, Mechanics 1, Engineering 1, Vacc Suit 2, Streetwise 1

Fourth Engineer/Hangar Nori Sumitomo 7CBA7A Age 26 Terms 2
Engineering 1, Electronics 2, Vacc Suit 1

Far Horizon Crew Sheet

Name: **Lucas Adair** Appearance: _____

Age: **46** Gender: **male** Total Rads Received: **55**

Command-Pilot

Characteristics

Strength	7	Intelligence	A		
Mod		Mod	+1		
Dexterity	7	Education	A		
Mod		Mod	+1		
Endurance	8	Social	8		
Mod		Mod			
Radiation Exposure					

Wound Track

Strength ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Dexterity ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Endurance ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Skills

Pilot 3, Admin 1, Leadership 2, Vacc Suit 2, Electronics 2, Comms 1

Far Horizon Crew Sheet

Name: **Sara Cheng** Appearance: _____

Age: **38** Gender: **female** Total Rads Received: **45**

Pilot

Characteristics

Strength	5	Intelligence	9		
Mod	-1	Mod	+1		
Dexterity	5	Education	B		
Mod	-1	Mod	+1		
Endurance	8	Social	6		
Mod		Mod			
Radiation Exposure					

Wound Track

Strength ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Dexterity ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Endurance ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Skills

Pilot 3, Navigation 2, Astronomy 1, Vacc Suit 1

Far Horizon Crew Sheet

Name: **Vic Peterson** Appearance: _____

Age: **38** Gender: **male** Total Rads Received: **45**

Senior Mission Specialist

Characteristics

Strength	A	Intelligence	8	
Mod	+1	Mod		
Dexterity	5	Education	C	
Mod	-1	Mod	+2	
Endurance	9	Social	5	
Mod	+1	Mod	-1	
Radiation Exposure				

Wound Track

Strength ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Dexterity ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Endurance ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Skills

Glaciology 2, Geomorphology 2, Vacc Suit 1, Comms 1, Mechanics 1

Far Horizon Crew Sheet

Name: **Katiya Kuznetsov** Appearance: _____

Age: **30** Gender: **female** Total Rads Received: **35**

Mission Specialist 1

Characteristics

Strength	7	Intelligence	9	
Mod		Mod	+1	
Dexterity	7	Education	C	
Mod		Mod	+2	
Endurance	4	Social	7	
Mod	-1	Mod		
Radiation Exposure				

Wound Track

Strength ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Dexterity ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Endurance ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Skills

Astronomy 1, Petrology 2, Computer 1, Vacc Suit 1

Far Horizon Crew Sheet

Name: **Shireen Lanstrom** Appearance: _____

Age: **38** Gender: **female** Total Rads Received: **45**

Mission Specialist 2

Characteristics

Strength	6	Intelligence	A	
Mod		Mod	+1	
Dexterity	4	Education	B	
Mod	-1	Mod	+1	
Endurance	8	Social	8	
Mod		Mod		
Radiation Exposure				

Wound Track

Strength

Dexterity

Endurance

Skills

Survival 1, Geomorphology 1, Mechanics 2, Engineering 1

Far Horizon Crew Sheet

Name: **Michael Dodds** Appearance: _____

Age: **34** Gender: **male** Total Rads Received: **40**

Navigator

Characteristics

Strength	5	Intelligence	9	
Mod	-1	Mod	+1	
Dexterity	9	Education	8	
Mod	+1	Mod		
Endurance	6	Social	4	
Mod		Mod	-1	
Radiation Exposure				

Wound Track

Strength

Dexterity

Endurance

Skills

Navigation 2, Comms 1, Computer 2

Far Horizon Crew Sheet

Name: **Kurt Hollister** Appearance: _____

Age: **50** Gender: **male** Total Rads Received: **60**

Medical Technician

Characteristics

Strength	5	Intelligence	8	
Mod	-1	Mod		
Dexterity	5	Education	7	
Mod	-1	Mod		
Endurance	6	Social	9	
Mod		Mod	+1	
Radiation Exposure				

Wound Track

Strength ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Dexterity ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Endurance ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Skills

Medicine 3, Computer 1, Biology 2, Carousing 1, Recon 1, Gun Combat 1, Vacc Suit 1, Electronics 2

Far Horizon Crew Sheet

Name: **Helen McLean** Appearance: _____

Age: **34** Gender: **female** Total Rads Received: **40**

Hydroponics Specialist

Characteristics

Strength	7	Intelligence	B	
Mod		Mod	+1	
Dexterity	7	Education	A	
Mod		Mod	+1	
Endurance	4	Social	6	
Mod	-1	Mod		
Radiation Exposure				

Wound Track

Strength ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Dexterity ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Endurance ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Skills

Mechanics 2, Carousing 1, Biology 1

Far Horizon Crew Sheet

Name: **Sven Ackerman** Appearance: _____

Age: **50** Gender: **male** Total Rads Received: **60**

Chief Engineer

Characteristics

Strength	6	Intelligence	B		
Mod		Mod	+1		
Dexterity	7	Education	B		
Mod		Mod	+1		
Endurance	B	Social	5		
Mod	+1	Mod	-1		
Radiation Exposure					

Wound Track

Strength ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Dexterity ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Endurance ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Skills

Engineering 4, Mechanics 2, Leadership 1, Vacc Suit 1, Admin 1, Liaison 1, Gambling 1, Computer 1

Far Horizon Crew Sheet

Name: **Bob Summerfield** Appearance: _____

Age: **46** Gender: **male** Total Rads Received: **55**

Second Engineer/ Reactor Specialist

Characteristics

Strength	9	Intelligence	8		
Mod	+1	Mod			
Dexterity	9	Education	8		
Mod	+1	Mod			
Endurance	6	Social	8		
Mod		Mod			
Radiation Exposure					

Wound Track

Strength ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Dexterity ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Endurance ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Skills

Mechanics 3, Computer 2, Engineering 1, Piloting 1, Medicine 1, Jack-of-all-Trades 2

Far Horizon Crew Sheet

Name: **Jason Bartikovsky** Appearance: _____

Age: **30** Gender: **male** Total Rads Received: **45**

Third Engineer/Life Support Specialist

Characteristics

Strength	4	Intelligence	7	
Mod	-1	Mod		
Dexterity	9	Education	9	
Mod	+1	Mod	+1	
Endurance	7	Social	3	
Mod		Mod	-1	
Radiation Exposure				

Wound Track

Strength ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Dexterity ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Endurance ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Skills

Engineering 1, Mechanics 1, Computer 1, Vacc Suit 2, Streetwise 1

Far Horizon Crew Sheet

Name: **Nori Sumitomo** Appearance: _____

Age: **26** Gender: **female** Total Rads Received: **40**

Fourth Engineer/ Hangar Specialist

Characteristics

Strength	7	Intelligence	A	
Mod		Mod	+1	
Dexterity	C	Education	7	
Mod	+2	Mod		
Endurance	B	Social	A	
Mod	+1	Mod	+1	
Radiation Exposure				

Wound Track

Strength ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Dexterity ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Endurance ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Skills

Engineering 1, Electronics 2, Vacc Suit 1

SPACESUITS AT TL 8-9

Whether you live on Luna or Titan, Ida or Mercury, your space suit is more important to you than any mere piece of clothing. You spend hours in it every week and some people spend most of their working day inside a suit. Your suit is personal, customised to the way you work. Colloquially they are known as vacc suits (from their common use in the 'vacuum' of outer space), but these suits are able to operate on the dusty, rocky surface of Luna, on chilly ice sheet environments like Enceladus, in the staggeringly cold temperatures of a world like Titan, in fierce dust storms on Mars and in many other hostile places besides.

Vacc suits are complex. Each is a self-contained space vehicle in its own right, with a breathable atmosphere, pressure regulation, heating and cooling controls, drinking water, 10km radio and TV camera communications, 5m range flashlight, limited micrometeoroid and radiation protection and the ability to do all that in a low pressure environment that threatens to turn your suit into a balloon.

Rather than present player characters with a single off-the shelf vacc suit, **Orbital**, like the suit manufacturers themselves, offer customizable suits for the hard-working spacer who has exacting needs. Players should design their suits as soon as they have designed characters, or else simply pick up the soft suits installed as standard on most newly built space vehicles.

VACC SUITS & ACTION PENALTIES

Suits are bulky and constraining. All suits begin with a basic penalty to all physical actions taken while in the suit. Added extras further increase general encumbrance, and can further increase this action penalty. Training and experience counts for a lot, though. The wearer can use his Vacc Suit skill to cancel out the action penalty DMs up to his level in that skill. For example, a wearer with Vacc Suit 2 inside a soft suit (action penalty -4) only suffers a -2 when attempting physical tasks.

Soft Suit (TL 8): The soft suit is the standard vacc suit available at TL 8. Used at one time for spacewalks (Extra Vehicular Activities, or EVAs), the soft suit is now relegated for use as an emergency pressure suit worn by space vehicle crews. Although bulky when pressurized, there are no action penalties when reclined in an acceleration couch, operating controls or computers. Unpressurized, it is quite comfortable, utilitarian and easy to wear. Although it is possible to carry out EVAs in the pressurized soft suit, the -4 Action Penalty (AP) make it inferior to the TL 9 hard suit. The soft suit is used to provide life support and mobility within a spacecraft or on a world surface for up to 6 hours. It is a bulky soft suit with a helmet and backpack PLSS (Portable Life Support System). It provides Protection 4, masses 24kg and Costs Cr7,000. It cannot be customized. All actions carried out in a pressurized soft suit are done so with a -4 action penalty.

Hard Suit (TL 9): The hard suit is capable of maintaining its shape and flexibility while pressurized (unlike the soft suit). This makes it ideal for all EVAs in zero gravity and on a world's surface. With fewer APs, both movement and work are made much easier. However, hard suits are not ideal for long-term wear, being uncomfortable for any duration of 6 hours or more. Some DSV crews employ hard suits for EVAs, while using soft suits for all intra vehicle activity. Most crews have switched to hard suits and dress casually while on board, resorting to their suits during any period of danger (rendezvous, fly bys, atmospheric braking, EVAs, dockings and other situations in which there may be an unexpected decompression through hull puncture). Suits designed for Project Orpheus have thermal protection, allowing them to function at temperatures down to -270°C. In addition, to prevent flash explosions should the radiators on the PLSS accidentally touch super-cold surfaces, they are carefully shielded.

The hard suit is a modular design, and although once built cannot be altered, it can be tailored by the manufacturer to suit the needs of the customer. Weights, costs and life support duration are all defined by the buyer. Any hard suit is more expensive than a soft model, but the player character gets what they *want*.

Building a Suit

To build a hard suit, select a suit design, select a PLSS and then choose up to three options that make your suit unique. Total the weight, the cost and make a note of any penalty assigned to any actions taken when in the suit. A suit is made up of several components: a torso assembly, a helmet and limbs. Select the basic suit design from the table below.

Suit Design	Description	Action Penalty	Mass (kg)	Cost (Cr)	Base Protection
Full Hard Suit	Hard shell suit with rotating joints	-1	16	9,000	5
Semi Hard Suit	Hard shell torso with flexible arms and legs	-2	14	7,000	4

Next, select the type of PLSS that will be worn with the suit. The PLSS includes oxygen, pressure regulation systems, and unlike Apollo and ISS systems which cooled their suits with a sublimator (which only works in a vacuum), these TL 9 PLSS employ a water membrane evaporation cooler that chills the wearer using the same principle as sweating. It works fine on Mars, Titan and other worlds with an atmosphere. Another TL 9 innovation is the way in which the PLSS dumps wasted carbon dioxide every few minutes, rather than collect it within lithium hydroxide/metal oxide scrubbers, a method used by the old TL 7 and 8 suits. Who wants to have to constantly replace those CO_2 scrubbers?

PLSS	Duration (hrs)	Mass (kg)	Cost (Cr)
A	6	7	3,000
B	9	8	5,000
C	12	12	10,000

All suits have 3 customizable slots that can be used to build in extra features. Select up to three from the table below. Once chosen add the combined weights, this total may adversely affect the suit's action penalty: if 4kg+ then apply a DM of -1 to the action penalty, if 7kg then apply a DM of -2 to the action penalty and if 10kg then apply a DM of -3 to the action penalty. Note that even the 'cosmetic' option called Baospace Fashion also takes up a full slot, that futuristic ergonomic design takes up valuable space.

Feature	Description	Cost (Cr)	Mass (kg)
Ablative Outer Layer	Protection 6, from lasers only		2
Atmosphere Tester	Provides detailed chemical analyses	500	1
Baospace Fashion	A sleek, tailored and futuristic look	2000	-
Binoculars	Fold-down vision aids, with laser range finder	800	1
Climbing Harness	Integral harness with rings and attachment points for rope climbing and rappelling	250	-
Collapsible Helmet	Helmet folds back and slots into hard torso shell; for the hard or mixed suit only	500	-
Comms, Long Range	Extends radio range out to 50km	250	-
Crampons	Extending boot spikes for stability on icy terrain	200	1
Extended Life Support	Extend PLSS duration to 18 hours	10,000	4
Flashlights	Twin helmet-mounted flashlights, illuminating up to 20m	200	-
Flare Damper	Magnetic field generator that can protect against solar flares, but saps power from the PLSS at a rate of 5 minutes per PLSS hour	1000	3
Inertial Locator	Indicates direction and distance travelled from a starting location	1,200	1.5
Mag Boots	Allow walking on metal hulls and deck plates in zero-G	200	2
Power Pack	Extra power source with cables, for running equipment etc. as an emergency back-up	1000	2
Radiation Counter	Provides warnings of radiation threats	200	-
Resistant Outer Layer	adds +2 to suit Protection	1000	3
Zero-G Tool-Belt	With zero-G tools attached	500	2
Spotlight	Powerful helmet-mounted spotlight, illuminating up to 50m	1000	1
Thruster Unit	PLSS- thrusters providing movement in zero-G for a total of 10 minutes	1000	4
Wrist-Mounted Computer	as Computer/1	1000	1

Suit Colours

Early explorers on Mars soon discovered that they needed to identify each other while out on the surface and wearing heavy pressure suits. A form of identification was created; the back of the suit's helmet became a place to put a personal logo or custom paint job, this large space could be seen from a distance and instantly identify the wearer. Since most designs wrap around the top and sides too, identification is often possible from the sides and front also. Designs might be chequered patterns, solid colours, geometric shapes, coloured letters, pictures, logos or anything else that is colourful and recognizable from a distance. It's not just scientists and explorers that practice this custom, but miners, engineers, construction workers - almost everyone! Passengers, visitors and temporary crew-members hire or borrow TL 8 soft suits that have blank helmet backs with simple stencilled numbers for ID. The players with customized suits might want to create their own custom logo (just draw round a coin and grab some colouring pens or pencils).

BREACH!
Once a suit is breached (perhaps from colliding with a piece of sharp debris while the wearer is repairing a drive) it takes 1-3 turns for the suit to repair the tear.

In the first turn the wearer suffers 1 pt of damage, in the second turn he suffers 2 pts of damage and in the third and subsequent turns he suffers 4 pts.

For larger breaches, the damage is instant and often fatal, depending on the environment. A breach on Mars can be handled with the suffocation rules, other worlds should factor in temperature (see the Core Book).

To repair a major breach: Vacc Suit, 10-60 seconds hours, Difficult (-2) or Very Difficult (-4) if repairing one's own suit. All suits include a suit repair kit.

Teams or personnel grades are usually identified with coloured arm-bands. For example, on a construction site, managers have red arm-bands, workers blue armbands, and scientists green armbands. Stencilled numbers on these armbands denote the wearer's actual site ID number.

Life Inside the Suit

It goes without saying that a vacc suit can be bulky and uncomfortable, but there are some comforts. A full-body garment is worn beneath the suit that includes a water-cooled layer, but warm water can instead be sent through the system as the suit detects a change in the outside temperature.

Drinking water, typically a litre or two, is included and a drinking tube is fixed close to the wearer's mouth. He or she can also mount a food stick into a nearby housing, giving the wearer a chance to eat something if in the suit for several hours.

PRE-BREATHING (Hard Science Option!)
It is possible to reduce the AP on the soft suit, making it much less of a cow to work in. Pressure inside can be lowered, lessening the ballooning effect. However, with less air comes less oxygen and the wearer will need to switch the air to 100% oxygen, or risk blacking out. AP is reduced to a more manageable -2. The downside is significant; leaving the airlock under such partial pressures will usually result in decompression sickness ('the bends'). To prevent this the space-walker can either spend 8 hours slowly depressurizing in the airlock (what is known as 'camping out'), or pre-breathe pure oxygen for 4 hours before he begins the EVA in his partial-pressure suit.

The Bends: *Symptoms of the bends (deep pain, confusion, fatigue) occur in 1D6 hours. The spacer makes a Difficult (-2) End roll, and if successful suffers 3D6 damage. If unsuccessful, the bends are almost certainly fatal (6D6 damage). Quick medical care (Medicine 6+) with oxygen mask and medkit, can reduce damage by 6 points.*

Treat the Bends: Medicine, 1D6 hours, Average (+0)

Urine is processed in thigh pockets and sent to the PLSS for recycling as drinking water. And if you need to defecate, then the suit holds it in place, that's all it can do. Even the best of the TL 9 units can't reprocess that stuff. Go before you put the suit on.

A TL 8 suit will include gauges on wrists and chest that allow the wearer to check battery life, pressure, temperature, air and the PLSS system. At TL 9 these are integrated into a Heads Up Display that appears on the wearer's faceplate. Comms are all voice activated, with a wrist mounted manual control as a back-up. Controls for the PLSS are also mounted on the same wrist controller. It is standard practice to switch on the helmet camera when working, it means you aren't alone, comrades inside the base or DSV can give you guidance and advice, and everything you see is recorded for later analysis. A small light illuminates the wearer's immediate working area.

The PLSS can be recharged (air, water and electricity) at dedicated connectors within most airlocks. Other places, such as mining facilities, may have large banks of connectors in an EVA prep hall for many users to top up their PLSS at once. Every acceleration couch in a spacecraft includes an umbilical allowing the wearer to take-off the PLSS (it gets in the way when laying in the couch) and rely on air from the vehicle if needed. Most crewman take off the helmet once aboard, but keep the suit on.

Getting it On

TL 7 and 8 soft suits are only partially pressurized so they don't balloon, and circulate 100% oxygen to compensate for the thin atmosphere. Getting into one requires the wearer pre-breathe oxygen to reduce nitrogen in the bloodstream. TL 9 hard suits are able to circulate a normal spacecraft cabin-type atmosphere at normal pressures due to innovations in suit materials, keeping them flexible while preventing them from ballooning. Player characters can take their helmets off in the cockpit without suffering the bends. It is possible to climb inside a vacc suit while wearing normal clothes, but they'd better be tight fitting, the urine connections won't work and without the water-cooled full body garment, any movement becomes hot and sweaty. Increase the action penalty by -1 every 2 hours.

Putting on a suit requires 10 minutes if help is available, 15 minutes if it isn't. Taking the suit off takes 3 minutes. It is possible to do either of these a lot faster in an emergency! To speed up the process use the tasks below (do ***not*** factor in the suit's action penalty).

Putting on a vacc suit while under stress: Vacc Suit, 1D6 mins, Difficult (-2)
Taking off a vacc suit while under stress: Vacc Suit, 1D6x 10 seconds, Difficult (-2)

Working on the surface of Tartarus

Working in zero-G is extremely hazardous, but working on the surface of Tartarus is more so! The greatest dangers are 1) suit malfunction causing a PLSS shutdown, temperature drop or oxygen starvation, and 2) suit puncture resulting in rapid decompression.

When-ever player characters are working outside in their suits, the opportunity always exists for either of these two eventualities. These aren't random death situations, though, mean-spirited, Deus Ex Machina methods of killing characters on a whim. They are realistic threats that can be mitigated, or at least dealt with by player characters. They are ways in which tasks suddenly become harder, more complicated and more stressful – always good within the context of a roleplaying game!

To Conduct Hard Work in a Vacc Suit: Vacc Suit, Endurance, varies – often an hour or more, Routine (+2)

Success indicates no problems.
Failure indicates that there has been an incident. Roll 1D6 and add the players Vacc Suit skill.

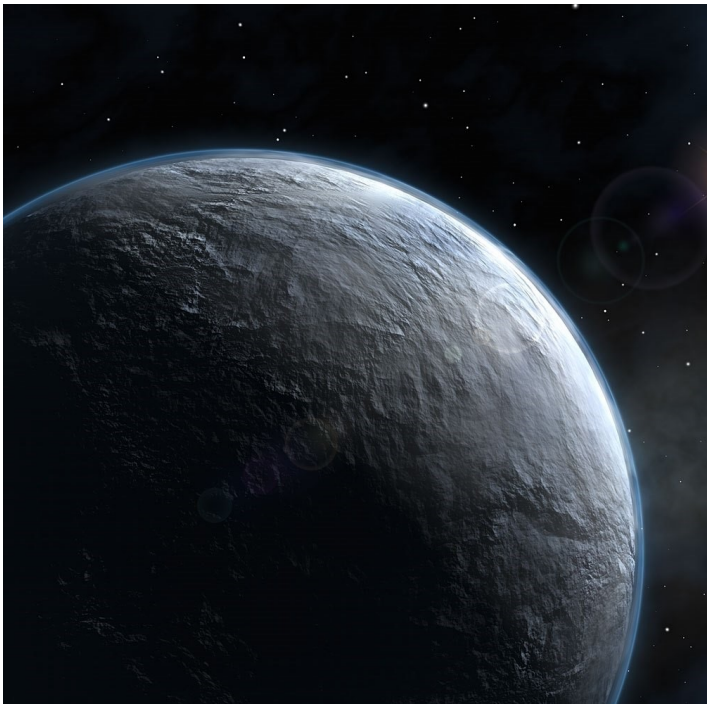
1D6	*Problem*
1	No apparent problem
2	Slow temperature drop begins, the PC has an hour before freezing!
3	Suit instruments are erratic, the PLSS will unexpectedly fail in 4D6 minutes.
4	Suit puncture. See the BREACH! Rules (above)
5	Visor fogs up every 10 minutes, unless wearer rests for 5 minutes.
6	No apparent problem; but drinking water fails.
7	No apparent problem
8	Suit instruments are erratic, but the suit seems intact

669844 TARTARUS

X411000-0

Those who … have committed many and terrible deeds of sacrilege, murders foul and violent or the like, such are hurled into Tartarus, which is their suitable destiny - and they never come out. Those again who have committed crimes, which, although great, are not unpardonable—who in moment of anger, for example, have done violence to a father or a mother and have repented for the remainder of their lives, or who have taken the life of another under extenuating circumstances, these also are plunged into Tartarus.

Socrates, 5th C BC



REFEREE ONLY

Welcome to Tartarus, a small planet, similar in size to Mars that once nurtured a thriving alien civilization. It was not the main world of the alien star system but instead a colony of engineers and workers that mined a neighboring asteroid belt for raw materials. Tartarus was an industrial world producing the high-tech goods that kept the alien civilization running. But something went wrong - Tartarus was flung from its orbit to begin a lonely trek across the bleak, interminable vastness of interstellar space. The populated planet was quite Earth-like, with seas and continents and an atmosphere of nitrogen, with enough oxygen for it to be breathable. There was life both in the ocean and on land, despite the planet's low gravity and thin atmosphere. Alien technology had reached approximately TL 10, although there was as yet no interstellar drive and that in itself was the cause of the planet's misfortune.

Scientists on Tartarus competed to build a faster-than-light warp drive that could take starships out across the galaxy. Vast resources were put at their disposal, and huge engineering projects were begun, both in orbit and on the planet's surface. At once both a catastrophic failure and a catastrophic success, one warp drive project opened up a warp-tunnel of gigantic proportions and accelerated the planet itself through the rift. The event lasted only minutes, but scientists icily noted that the world was already at the very edges of its star system and heading out, into interstellar space. The immense change in trajectory could not be changed and the planet had jumped so far in just a few minutes that no rescue would ever reach them. The reaction-drive spacecraft available to the inhabitants of Tartarus were equally useless. All hope rested on the engineers who had caused the warp-phenomenon, but try as they might, the experiment could not be replicated or reversed.

Within days, and then weeks, the planet began to die. Groups of aliens, engineers with a can-do attitude, built shelters and planned for the future. No one wanted to die. But millions did. Starved and frozen, the civilization vanished.

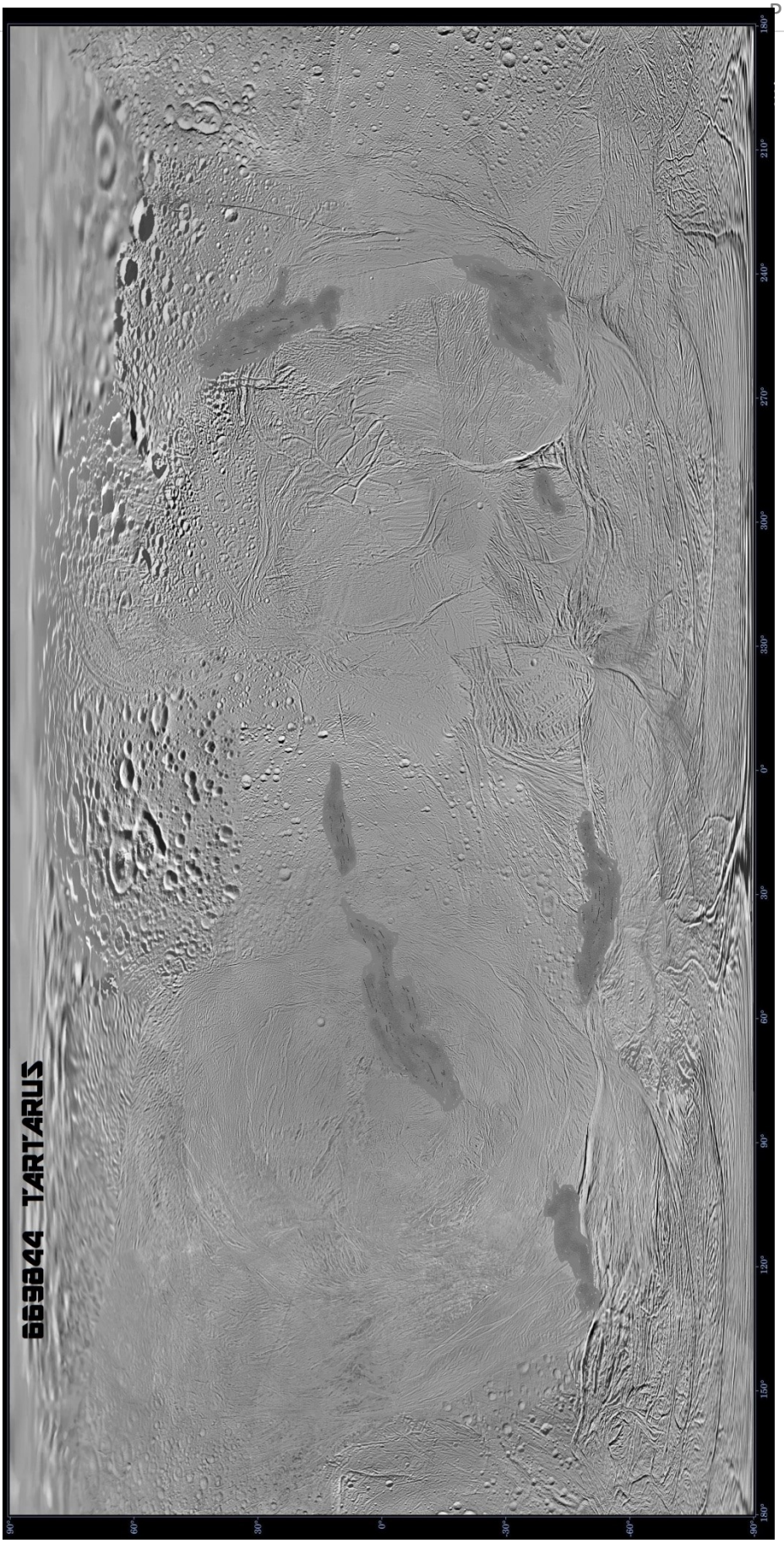
Within a week, the average global surface temperature would dropped below 0°C. In a year, it fell to –100°C. The top layers of the oceans froze over but in an strange 'end-of-days' irony, it was that layer of ice would insulate the deep water below and prevent the oceans from freezing solid. After many millions of years of interstellar wandering, the surface of Tartarus reached a stable –400°C, roughly the temperature at which heat radiating from the planet's core equaled the heat that the Tartarus radiated out into space. For months and years following the ejection of Tartarus, its breathable atmosphere began to freeze and it literally fell to the ground as water ice. Little remains today of this atmosphere, except for a trace, and what was once the life-supporting envelope surround Tartarus is now a 60 metre-layer of ice.

Without sunlight, photosynthesis could not occur, plant life dies and the animal life that depended on it, died also. The hardiest of Tartarene microorganisms living on the surface survived. For several centuries, isolated settlements of aliens continued to eke out an existence in seabed habitats in the deepest and warmest parts of the ocean and in stations depending on geothermal power, just as some settlements do today in Iceland. But none survived more than a five hundred years.

THE MAPS

The two maps overleaf are non-colour surface radar images showing the relief and contours of Tartarus. The first can be given to the players as soon as they conduct the Radar Scan (see next chapter). The second map includes the best landing sites based on the surveys conducted, the crews thoughts and CASS's (the ship computer's) recommendations. It includes various sites of interest, each noted with a double digit number. Landings should be selected from these options.

TARTARUS X411000-0	
Diameter	**6320km**
Density	**5.12 grams per cm³**
Rotation (Sidereal Period)	**0**
Surface Temperature	**180°C**
Surface Gravity	**0.465 G**
Strength of Magnetosphere	**0.2 gauss (at the poles)**
Velocity	**18 million metres/hour** **431,780 km/day**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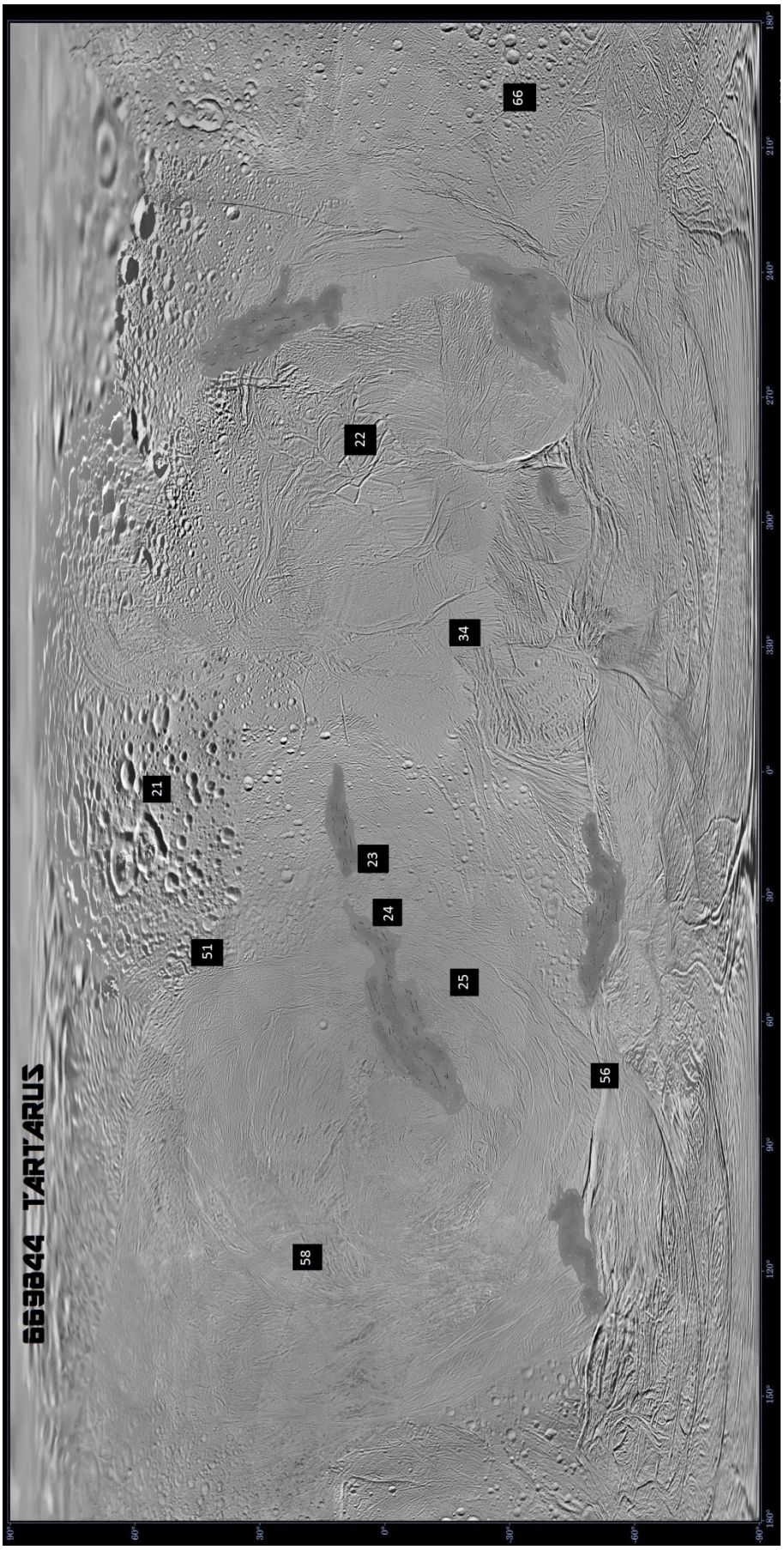
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1 – ARRIVAL IN ORBIT

<ELAPSED MISSION TIME 216,217 HRS 23 MINS>
Far Horizon groaned under the stresses of deceleration. CASS brought up the life support systems, she made the corridors and habs comfortable for the humans that were thawing out from their long hibernation.

Guzzling coffee and basking in the familiarity and hard reality of aluminum gratings, soft acceleration couches and plastic consoles, the crew began to turn their thoughts to Tartarus. High-rez images on high-definition monitors were shunned in favour of the starboard cupola. This huge viewing port afforded a panorama of inky dark, dominated by the milk-white monster Tartarus as it slid slowly beneath Far Horizon. A jigsaw of cracked ice sheets formed the beast's pale hide, whilst rugged mountain chains rose up like bony ridges, through the ice.

In fascination the crew watched as sickly-white ice passed out of sight, to be replaced, as the Far Horizon continued its orbit, by a smashed and bombarded surface of black and brown. Here the gods had hammered Tartarus with all of their fury, creating a blasted crater-filled wasteland of pitch-dark detritus. Nothing in the Solar System resembled this cosmic excavation site.

"It's a rotten tooth, the whole world," muttered Peterson "Pearly white – until you see the roots, black, rotten and half-eaten away…"

Sara Cheng, the pilot, tied the arms of her blue jumpsuit around her waist, and put her long hair into a pony-tail, "I guess Tartarus doesn't rotate. It's just been ploughing through the cosmos with a single face pointing in the direction of travel. How many millions of years…?"

Commander Adair at the back whistled, "What a world … and we've got only 4 days to make sense of it. Peterson, I want you to pick a six-man team for the landing. I'll lead the orbital survey. Key fact Earth wants answered – why does this Tartarus have an irregular trajectory. What is it that kicks in and makes this beast so unpredictable?

"May I remind you all," he warned, darkly, "that we are more than four billion miles, and two years, from Earth. All errors are serious, and it's likely that any accident will be fatal. Tartarus was the realm of the dead in classical mythology – but like Orpheus we are going to descend into hell and return unscathed…"

The player characters have 4 days (96 hours) from the time Far Horizon enters orbit, to complete the survey of the planet and then make the burn to return Earth. Everyone will need to sleep of course, but jobs and tasks can be rotated around the crew if needed. The referee should present the players with the following decisions:

1 Who will take a lander down to the surface? Who will stay in orbit? Those going down to Tartarus risk their lives and will be working hard. Each player should have a character on this 'away team'. Those who remain on the Far Horizon will be conducting their own orbital survey. They also have access to a second lander to act as a back-up, should the first team get into difficulties, or its lander is irreparably damaged.

2 Where shall the lander touch-down? Some time needs to be spent in orbit whilst an initial survey is conducted, in order to identify one or more potential target sites. Once that is achieved – they can go!

3 Which orbital surveys should be conducted first? Undoubtedly the landing team are itching to go, but they need a target location. Which survey will give up the most useful data and at the fastest speed? After the landing team departs, a crewman (on a rotating shift) should be assigned to remain in constant communication with it. A probe launched into a higher orbit can act as a comms relay for those times when the spacecraft is on the other side of the planet from the landing team. After that, those crewmen in the Far Horizon can decide which surveys to conduct at their leisure, as they make repeated orbits of the planet.

CONDUCTING THE SURVEY

Unlike many other RPGs, the characters here are scientists, not mercenaries or treasure-hunters. The primary goal is to locate interesting phenomena and to map, record and measure it. To this end a MISSION RECORD SHEET is included which the players are encouraged to fill out. The more data that is entered on to the MISSION RECORD SHEET, the greater the chance of mission success. Measures of success are indicated at the bottom of the sheet. Do the players want to leave Tartarus as a Doomed or Failed Mission, a Completed Mission, a Very Successful Mission, or as a Resounding Success?

The referee should emphasize that Tartarus has a secret to be discovered, much like most of the planets of our own Solar System. Each piece of recorded data has a chance of revealing ***part, or all, of that secret***. This SHEET is just a bit of fun, it isn't designed to make the players lives hell or have them jump through hoops. Tell them that it is a place for them to record any of their findings. Each box, when filled with data, has a typical time that each survey takes (because they are working to a 4-day deadline) and also a score awarded once completed. The scores can be added up as the mission progresses. The score at the end of the mission is, again, a bit of fun, not to be taken too seriously! Let's run through the entries, what should be entered into each box? What will each survey show?

Diameter

This is the planetary diameter measured pole to pole and around the equator. It is 6320 km, very similar to that of Mars. This scan will take 1-3 hours.

Density

This is the planetary density. It is 5.12 grams per cm^3, slightly less than Earth's. Tartarus is not like the icy moons of Jupiter or like dwarf planets, it is terrestrial, with a significant rocky crust overlain with ice. The scan will take 1-3 hours.

Rotation

This is the time it takes Tartarus to rotate once. Tartarus does not rotate! This scan will take 1 hour, just to make sure … and it will reveal that it does, however, have a very slight 'wobble'.

IR Thermal Scan
An extensive multi-spectral infra-red imaging scan of the surface (as the orbit of the Far Horizon allows). This shows a heat emission map of Tartarus, showing hot-spots of volcanic activity close to Area 024. Surface temperature on Tartarus is not as low as predicted for a rogue planet, averaging 180°C. This scan takes 2D6 hours.

Radiation Scan
An extensive gamma radiation spectrometry scan of the surface (as the orbit of the Far Horizon allows) which will give higher readings over solid rocky areas and a definite spike over Area 023. This scan takes 2D6 hours.

Radar Scan
A surface radar scan from orbit (as much as the orbit of Far Horizon allows), showing a detailed topographic map of the surface, including some things just below the surface and some things not visible to the naked eye. It reveals linear and rectangular features below the ice (to a depth of perhaps 5-10m) at Area 25 and a group of perhaps 30 very tall skyscraper-like structures (some 10-12 storeys or 30 metres) in Area 24. This scan takes 2D6 hours.

Gravity Scan
A measurement of the planet's gravitational pull at different points along the Far Horizon's orbit, giving hints about the makeup of the planet's internal structure. It reveals that Tartarus is terrestrial, with a crust consisting of silicates (minerals containing silicon and oxygen), various metals and other rocky materials. Like Earth and Mars, the planet is differentiated, meaning that it has a central iron and nickel core surrounded by a less dense, silicate mantle and crust. Surface gravity can be calculated as 0.465 G (much greater than Mercury or Mars at 0.37 G, roughly equal to half that on Earth). This scan takes 2D6 hours.

Magnetic Scan
An extensive magnetic scan of the Tartarene magnetosphere (as the orbit of the Far Horizon allows). This scan shows that Tartarus has a powerful magnetosphere, suggesting that it has a molten core that produces a magnetic field measuring 0.2 gauss at the poles, compared with Earth's magnetosphere of 0.305 gauss. This is incredible, indicating a very active, molten core [referee: a product both of the extraordinary stardrive cataclysm which launched Tartarus into the void, and repeated minor firings of the stardrive over the millennia]. The bow-shock of the Earth's magnetosphere sits over the dayside and is pummelled by the solar wind, it tails away for more than 6 million km from the night-side. On Tartarus there is a similar bow-shock, but it is not caused by collision with the solar wind, but by collision with the interstellar medium (gasses and dust). Because of this the magnetosphere is aligned not with the Sun, but with the heavily cratered 'north pole' and the direction of the planet's travel through space. The magnetosphere is much smaller than Earth's, the tail for example, trails out to around 890,000 km away from the south pole.

Using magnetic induction signals of plasma currents, in conjunction with multi-frequency electro-magnetic sounding, the thickness of the ice can be determined (averaging 8 km, but in places at cracks only 10-50m thick), along with the existence of any sub-surface ocean and its salinity. There is an ocean, centered around Area 58. There are thin, weak points in the ice at a number of cracks at Area 25. This scan takes 2D6 hours.

FAR HORIZON MISSION RECORD SHEET

STUDY FROM ORBIT				
Diameter	**Density**	**Rotation**	**Photo Scan (darkside)**	**Photo Scan (light side)**
1-3 hrs (1 pt)	1 hr (1 pt)	1 hr (1 pt)	3 hrs (1 pt)	3hrs (1 pt)
Radiation Scan	**IR Heat Scan**	**Radar Scan**	**Magnetic Scan**	**Gravity Scan**
2D6 hrs (2 pts)	2D6 hrs (2 pts)	2D6 hrs (2 pts)	2D6 hrs (2 pts)	2D6 hrs (2 pts)

STUDY ON THE SURFACE			
Location 1	**Imagery**	**Measurements**	**Samples**
	varies (2 pts)	varies (2 pts)	varies (2 pts)
Location 2	**Imagery**	**Measurements**	**Samples**
	varies (2 pts)	varies (2 pts)	varies (2 pts)
Location 3	**Imagery**	**Measurements**	**Samples**
	varies (2 pts)	varies (2 pts)	varies (2 pts)

[At the base of each box is the time taken to run the survey, followed by the points scored]
[Total Result: 1-9 FAILED,10-17 COMPLETED,18-27 VERY SUCCESSFUL,28+ RESOUNDING SUCCESS]

Photo Scan (Darkside)
An extensive photographic survey of Tartarus's 'dark side'. Note this is not dark due to the rotation of the planet in relation to the Sun, but dark due to a surface layer of dust covering the entire, heavily cratered north pole. Under scrutiny, it is obvious that the darkside faces the direction of the planet's travel and that this explains its coating of cosmic dust and the phenomenal number of meteor strikes on the surface. This scan takes 2D6 hours.

Photo Scan (Lightside)
An extensive photographic survey of Tartarus's lightside. Note that 'lightside' does not mean 'facing the Sun', it merely means the white icy side of Tartarus that is not covered in black dust. The lightside is covered in pristine ice and shows almost no sign of meteor impact. It will show quite distinct areas of ice and the areas of rocky mountain that lay above the ice layer. Spectroscopy shows that there are (in some places) three layers of ice. The lowest layer is salt-rich water ice, next is a layer of Earth-like water-ice followed by a layer of carbon dioxide ices. These ice layers (where they all occur) have different origins, the lowest layer represents the top of the frozen ocean, next is the frozen water-ice of Tartarus's nitrogen-oxygen atmosphere. Finally in some places, particularly over the frozen oceans, sits a layer of volcanically-ejected carbon dioxide ice. This has helped to insulate the ocean below and allowed it to remain liquid in many places. This scan takes 2D6 hours.

Surface Location
The referee or players should enter the location they are exploring here.

Surface Imagery
Photographs must be taken of the area along with video. What structures are there? Interesting features?

Surface Measurements
There must be scientific measurements for this box to qualify toward the outcome of the mission. If they are ice fumaroles, how high are they? What temperature is the steam inside? What are the dimensions of buildings or important crevices? How thick is the ice? There are many things to measure. Try to get three or four, at least.

Surface Samples
Take something back! Ice core samples, ice samples, rock samples (maybe different types or locations?), atmospheric samples … try to get three or four at least.

MAPS
The first map of Tartarus is a radar image giving the crew quite a comprehensive image of the surface of the planet. The second map is given to the players once they have conducted a few scans from orbit. It gives the locations of the most interesting exploration sites based on the data received, compiled and analysed. Print it off and hand it to the team.

PREPPING FOR THE LANDING
The landing team might be getting frustrated whilst they wait for the initial orbital survey, if that is the case they can get on with designing their hard-suits (if the referee wants to give them that option) and then prepping the lander they intend to use for the mission. There are two Palomino landers and they must pick one (it will determine their call-sign for the mission): HL-562 CLARION or HL-563 ECHO.

Palomino Heavy Lander (HL): The Palomino is used to ferry passengers to a world surface from a DSV, or to cross from a Lagrange station to the Moon. Using a 10-ton hull, the heavy lander is capable of 3 burns, carries 1.5 tons of fuel and has a crew of two. It is fitted with an airlock, landing suspension and chemical batteries that provide 40 days of power. The craft has a 0.54 ton cargo bay and a cabin with couches enough for 6 suited passengers. The heavy lander costs MCr6.39.

Cargo and Kit: The 540 kg. cargo section will carry the landing team's equipment. They had better choose wisely! The Kit List below suggests items that might be useful, and their weights.

Item	Weight
Spare Hardsuit	16 kg.
Spare Softsuit	24 kg.
Spare PLSS (Suit life support pack)	8 kg.
General Repair Kit	12 kg.
Portable Fuel Processor (Manufactures 1.5 ton fuel in 18 hrs.)	100 kg.
Food and Water (24 man-days)	100 kg.
Honda Two-Man Snowmobile	300 kg.
Universal Tripod	5 kg.
Full Video Camera	3 kg.
Ground Penetrating Radar	10 kg.
2 x Folding Picks, 2 x Folding Shovels	8 kg.
Cable 4 x 50m and Attachments	10 kg.
Powered Winch on Tripod	25 kg.
Floodlight on Tripod with Battery	10 kg
Trauma Kit (serious injuries)	8 kg.
Survey Module & Laser Range Finder	20 kg.
Grapple Gun & 20m cable	5 kg.
4 x Shaped Explosives (mining charges)	4 kg.
Emergency Shelter (6 suited people)	50 kg.
Ice Tunneller (tunnel 2m diameter)	50 kg.

The landers have fuel enough for 3 burns.

BURN OPTIONS TABLE

Planetary System Manoeuvres	Burns Required
Lander descends to surface	1
Lander ascends to orbit from surface	1
Minor orbit change	1
Single Surface to surface flight	1

Note that the lander can be used to descend to a site (1 burn), later lift off and manoeuvre to a second site (1 burn), and then lift off and return to orbit (1 burn, for a total of 3 burns, the Palomino's total fuel capacity).

2 – LANDING

The descent of the lander takes around 30 minutes. Once undocked from the Far Horizon and drifting free, the pilot initiates a de-orbit burn, slowing the lander with respect to the planet's surface and causing it to lose altitude. Two situations occur, the first involves the pilot flying an efficient descent, the other involves him or her avoiding the effects of an ice geyser during final approach.

Situation 1 - Descent
The pilot must make a skill roll to ensure an accurate, trouble free descent:

To bring the lander out or orbit: Pilot, Intelligence, 30 minutes, Average

Success results in an accurate descent.Failure indicates a problem. Like Neil Armstrong on the Eagle, too much fuel may be burnt off, (i.e. an additional Burn) leaving the Palomino with only a single Burn available for its trip back to orbit. Or the lander may overshoot its intended landing site by several kilometers, forcing the team either to use their spare Burn to take-off and re-position, or else trek that distance by foot. The two-man snowmobile may come in handy for this latter situation.

Situation 2 – Ice Venting
However accurate the descent, as the lander slows for its final approach, the white ice-crust only a few kilometres below, a powerful geyser of steam erupts from a hidden vent in the ice. This is caused by volcanic action beneath the ice, superheating water into steam that could knock the lander off its trajectory. The pilot may want to use extra fuel to gain height to avoid it, or conduct some evasive manoeuvres.

To gain height: Pilot, Intelligence, 1D6 minutes, Difficult (-2)

Success results in avoiding the effects of the vent, however, have one of the players roll 1D6. On a 4, 5 or 6 the manoeuvre has cost the Palomino 1 of its Burns. If unsuccessful, see below.

To outfly the geyser: Pilot, Dexterity, 1D rounds, Very Difficult (-4)

Success indicates that the pilot avoided damage to the vehicle and did not sacrifice any fuel doing so. Failure, however, indicates that the lander took damage.There will be several rounds of chaos as the lander tumbles, producing hi-G, and material with the cabin is thrown about. It will be extremely disorientating! Roll once on the Lander Damage table:

1D6	Location Damaged	Effect
1-2	Crew	The pilot suffers 2D6 trauma after the seat latch breaks. The co-pilot must take-over.
3	Landing Legs	The legs are buckled, making the normally Average (0) landing, Difficult (-2).
4	Cargo	Various referee-selected items of cargo are destroyed.
5	Airlock	The latch on the outer door is destroyed, meaning that the entire cabin must be pressurized and depressurized before the inner door can be opened. This takes 2 minutes.
6	Power-plant	Damage to the fuel cells. Power to systems will be intermittent during the mission. Should electronics be needed (radio, landing instruments, etc.) roll 1D6 and have that item temporarily fail on a 5 or 6.

Situation 2 – Touch Down
The lander must be brought down softly on the ice. The pilot, or the co-pilot if the pilot was injured in the ice venting situation, must make a control roll:

To touchdown: Pilot, Dexterity, 1D6 minutes, Average (0)
If the landing legs are damaged impose a -2 penalty. If the fuel cells are damaged then roll a 1D6, on a 5 or 6, the electronic instrument system fails also resulting in a -2 penalty.

Success results in a smooth touchdown amidst a cloud of disturbed snow! If unsuccessful, however, the landing goes badly and the lander strikes an ice formation or rock and comes to rest at an ungainly angle. A cruel referee will impose another Lander Damage result (a Crew result should be just that, a member of the crew *other than* the hapless pilot!) If the lander is at an angle, there is a problem - it cannot safely take-off unless it is somehow righted. This will probably involve several hours of digging, pulling, pushing and so forth. Players may come up with their own ingenious methods! Igniting the motor at such an unhappy angle may result in the lander catastrophically flipping over.

Even if the landing was a good one, ***another danger exists***. Anyone inspecting the outside of the lander will see that the descent motor turned ice to steam, but that this instantly refroze in big chunks and in solid slabs inside the motor housing and nozzle. It must be removed before a take-off is attempted, requiring 1-3 hours of digging and hammering. If there is no inspection then the crew will find out about the ice build-up the hard way. Once the dust has settled, the crew can unload their kit and begin exploring!

3 – EXPLORATION

An exploration of the surface will ostensibly involve the collection of images, samples and measurements.

Site 21: Black Craters
A photographic survey of Tartarus's 'dark side' shows that a surface layer of dust covers the entire, heavily cratered north pole. This indicates that the darkside faces the direction of the planet's travel and this explains its coating of cosmic dust and the phenomenal number of meteor strikes on the surface. Site 21 is a good landing site within the crater field.

Upon landing within a wide flat, crater floor, studded with rocky outcrops, the explorers can have a look around. The rocky surface is covered with layers of black ice, snow and ice mulched and ploughed over with the constant rain of interstellar dust over many millennia. New strikes by larger asteroids re-melt the ice, and churn up layers of black cosmic dust. As it all re-melts the ice is thoroughly remixed. The ice at the poles is around 80 m thick and if anyone takes ice core samples, it shows that it is thoroughly mulched and mixed with cosmic dust right down to the bedrock. Explorers can recover some of the interstellar material from the soil. It will be composed mainly of carbon and silica, as well as far more helium-3 (per cm^3) than on the Moon. Helium-3 mining here on Tartarus would be incredibly profitable and the substance going straight into the fusion reactors on Earth. Some basic geological studies of rock outcrops on the crater bottom will reveal rich mineral deposits, too, including tungsten, gold, silver, osmium, titanium, platinum, iridium, lithium and palladium!

Site 22: Chaotic Pressure Ridges

Orbital photography in combination with surface radar imaging has identified ice pressure ridges at Area 22. A liquid ocean (or ocean of 'slush') must be below, moving the ice around a little like tectonic plates. Where they push up against each other, high ice ridges are created, rather than mountains.

Upon landing away 200m away from some of the ridges it becomes apparent that they are quite huge, some 200-300m (600-1000' high). The ridges are magnificent, even when seen in the faded light far from the sun. While much of the ice sheet around them is white, the ridges are almost completely blue and some are turquoise or even blue-green or cyan. Some look almost like from frozen tropical ocean waves of tsunami-like proportions. Stunning. Blue icebergs on Earth have developed from the oldest of glaciers that have been under tremendous pressure for centuries. The process of squeezing releases and eliminates air that was originally caught in the ice by falling snow and have little internal air or reflective surfaces. When red light from the sun hits the iceberg, it is absorbed, rather than reflected and refracted outwards as blue or blue-green. This has happened here on Tartarus.

Site 23: Hot Zone

An extensive gamma radiation spectrometry scan of the surface gives generally higher readings over solid rocky areas (as a geologist would expect) but a definite and unexpected radioactive spike over Area 023. The measurements show that the area does not pose a threat to the explorers if they choose to investigate.

On landing the explorers find themselves on the ice-clad lower slopes of a mountain range. Local rocks do not display higher than normal levels of radiation. The source emanates from an area of cliff face covered with rock debris and settled with ice and snow. Volcanic rock ash litters the area from volcanoes further west. After more measuring and triangulating, it seems that the radiation source can be pinpointed, and an attempt can be made to clear away several hundred tons of rock scree and ice. The explosive mining charges will come in handy here – but watch out for flying missiles, the low-G will give the debris a potentially lethal range of 300m! Humans in their suits could be hit, but what about that flimsy little lander? It is said that the Apollo Lunar Module was so light-weight that an astronaut could have punched right through the thin hull! Anybody within 300m of the blast (and this radius can be calculated accurately by one of the characters if the players think of it) must make a

2D6 roll. If under partial cover they are hit by a 2D6 damage fragment on a result of 2; if standing in the open they are hit on a result of 5-. If the lander is within this radius, let's face it, it's going to be hit by something larger – and this will surely add to the drama! The referee should roll once on the Space Combat Hit Location (page 79 of **Orbital 2100**). Alternatively roll on the equivalent table within the Cepheus Core book.

What is behind the scree slope? Go to **The Vault**.

Site 24: Skyscrapers
A heat emission map of Tartarus shows hot-spots of volcanic activity at Area 024. The subsurface is much warmer here than elsewhere. Radar reveals a group of perhaps 30 very tall skyscraper-like structures (some 10-12 stories or 30 metres in height) at Area 24.

The lander puts down on to flat ice-covered ground several hundred metres from a range of snow-spattered rocky cliffs. Along the slopes of these hills are what appear to be white or semi-transparent towers, 30m (around 100') in height. Whitish steam or smoke is trailing from their tops, much like chimneys or the exhausts of heating systems on Earth. On some of the high peaks and in the mountains behind the towers, black smoke can be seen issuing slowly out: volcanoes. Rocky debris, pumice and tiny rock pebbles (ash) cover the ice upon which the lander sits. Upon closer inspection of the towers, should the PCs get out to them, it becomes clear that they are not artificial, they are not buildings, but ice fumaroles. Imagine the gas vents on the sides of volcanoes or the geysers of Yellowstone Park occurring at -100°C. The temperatures freeze the water on the outside of the gas or water jet, creating an icy funnel. Ice fumaroles on Earth can reach two or three metres. Here the low gravity means the gas or steam is propelled higher and the ice tower can support its own weight at much greater heights!

Site 25: Buried Lines
Ice-penetrating radar reveals various linear and rectangular features below the ice (to a depth of perhaps 5-10m) at Area 25. Although linear features, as well as circular and even hexagonal features can be found on Earth and other planets, rectangular ones are almost unheard of. What can they be?

Upon landing, the crew see a landscape of ice, cracked and tumbled, with a continual scatter of light pebbly-ash grains from volcanoes further north. There is a sinuous low pressure ridge of a bluish-hue running south to north about 100m from the landing site. Ground penetrating radar indicated a rocky surface beneath the ice, not ocean. This was once land. The ice is the remnant of the planet's atmosphere that snowed down to the surface. The rectangular features cannot be seen with the naked eye, and the ice tunneler will be required. It takes about an hour to set up and an hour to drill down, but this is a very difficult engineering project, even on Earth.

To drill a 2m diameter ice tunnel descending 8m: Engineering or Mechanics, Strength, half an hour, Difficult (-2).

Failure indicates the drilling stalls after 2m. Further failed attempts will extend the tunnel by 2m. Success indicates the full 8m is dug out within a half hour. The danger comes from working in such a hostile environment. Remember to check the rules covered in 'Working on the surface of Tartarus' (pg.34) every time the task is re-tried.

What sits at the bottom of the tunnel? Go to **The Building**.

Site 34: Linear Pressure Ridges

Orbital photography in combination with surface radar imaging has identified ice pressure ridges at Area 22. A liquid ocean (or ocean of 'slush') must be below, moving the ice around a little like tectonic plates. Where they push up against each other, high ice ridges are created, rather than mountains.

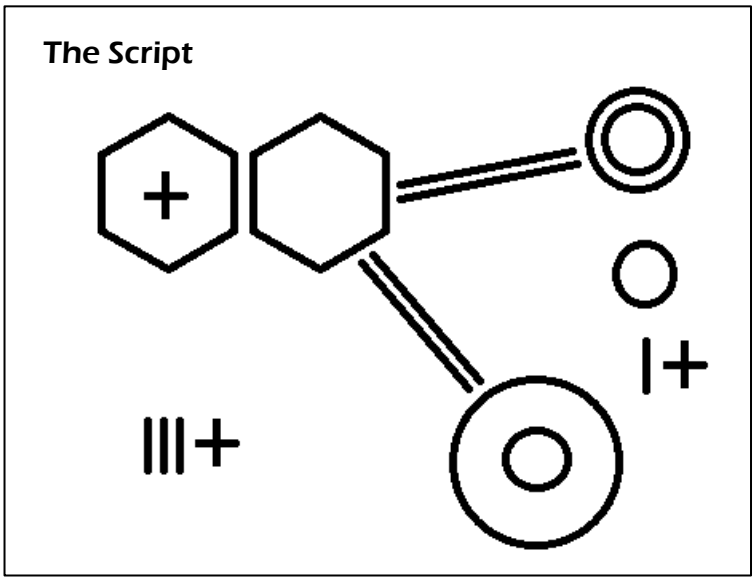
Upon landing away 200m away from some of the ridges it becomes apparent that they are quite huge, some 200-300m (600-1000' high). The ridges are magnificent, even when seen in the faded light far from the sun. While much of the ice sheet around them is white, the ridges are almost completely blue and some are turquoise or even blue-green or cyan. Some look almost like from frozen tropical ocean waves of tsunami-like proportions. Stunning. Blue icebergs on Earth have developed from the oldest of glaciers that have been under tremendous pressure for centuries. The process of squeezing releases and eliminates air that was originally caught in the ice by falling snow and have little internal air or reflective surfaces. When red light from the sun hits the iceberg, it is absorbed, rather than reflected and refracted outwards as blue or blue-green. This has happened here on Tartarus.

Site 51: Ancient Shoreline

From orbit, a definite shoreline can be discerned using photo imaging and surface radar. The ocean froze millions of years ago. There are a number of linear features running at right angles from the shore, away from the frozen sea. These features appear to be around 100-150m in length.

Upon landing on the rocky shoreline, covered in thick layers of ice and snow, the explorers can make out the icy plain of the sea stretching away from the coast. In some places rock outcrops are visible behind the shoreline. After a short walk, the explorers will soon stumble upon one of the linear features. It appears to be a black, 2m-high wall running along the surface of the rocky ground before disappearing into the frozen wastes of the icy ocean. Other lines lay parallel to this one, separated by about 20m. Are they natural, or artificial? At first inspection they will appear to be natural, they look to be volcanic dikes, sheets of basaltic magma squeezed between vertical cracks in the rock many millions of years ago. The 'walls' are the tops of these deep sheets of cooled basalt. Eons of erosion have removed the layers of rock above to expose these normally deeply buried magma structures.

But… upon closer inspection one of the player characters may spot something unusual on the side of the 'wall': marks or grooves. Analysis shows that the marks are geometric shapes, various hexagons, linked to triangles via pairs of parallel lines. The marks cover two square metres and were cut into the rock with some metal tool. This is proof of alien life! See the illustration titled 'Script'.



Site 56: Super Crevasse

Radar imaging of the surface reveals a long super crevasse in the southern latitudes. It measures more than 1000 km in length. Analysis from orbit suggests that the ice it splits apart is not sea ice, but thick layers of ice on top of Tartarus' rocky surface. At some points the cameras have picked up green colouration in the depths of the crevasse.

After landing some 200m away from the crevasse, the explorers can make their way to it. It appears to over 500m in width, a vast gulf of white, a vertiginous, icy Grand Canyon. Stunning bands of blue ice are visible in the sides of the crevasse, the blues are of many hues and caused by age-old ice coming under extreme pressures. It is assumed the explorers have targeted one of the locations of the green colouration. Some can be seen far below them, the depth of the crevasse appears to be perhaps 1000m, but some of the green colouring is also visible on large swathes of the crevasse wall, within reach of the team's climbing gear. The task to get a man or woman down there will be difficult and fraught with danger – but worth it! The brave individual will be lowered to the area of green colour, only to find it is more ice, thousands or tens of thousands of years old, subjected to extreme pressures that make it appear a vivid emerald colour (see the description for Site 22). But … if the character makes a thorough job of documenting the large green ice formations, they will also detect orange ice a little further down and to the side. If they can reach it, this will prove to be the real deal: it is some kind of algae, a yellow-orange bacteria living on the sides if the crevasse. The temperature down here is slightly warmer than on the surface, does that make a difference?

Site 58: Cracked Sea Ice

Using magnetic induction signals of plasma currents, in conjunction with multi-frequency electro-magnetic sounding, the thickness of the ice can be determined (averaging 8 km, but in places at cracks only 10-50m thick), along with the existence of any sub-surface ocean and its salinity. There are thin, weak points in the ice at a number of cracks at Area 58.

If the lander touches down here, to investigate the cracks or weak spots in the sea ice, the explorers see a vast icy plain. There are stars in the sky and no wind and no atmosphere. The ice is thin here (8m thick) and the ice tunneler will be able to bore a whole large enough to drop in a probe drone that can freely swim like a submarine. It takes about an

hour to set up and an hour to drill down, but this is a very difficult engineering project, even on Earth.

To drill a 2m diameter ice tunnel descending 8m: Engineering or Mechanics, Strength, half an hour, Difficult (-2).

Failure indicates the drilling stalls after 2m. Further failed attempts will extend the tunnel by 2m. Success indicates the full 8m is dug out within a half hour. The danger comes from working in such a hostile environment. Remember to check the rules covered in 'Working on the surface of Tartarus' (pg.34) every time the task is re-tried.

Once the probe is launched into the sub-ice ocean, it can be operated either from the lander or from the Far Horizon. The explorers can get back in the lander and leave if they like, dropping the probe into the hole was their main task, after all! The water is pitch black and cold, hovering just above freezing. There are rock outcrops and a thick silt on the seabed. Conducting a survey will be a task:

To survey a subterranean ocean: Comms, Education, 1D6 hours, Difficult (-2)

Failure indicates a fruitless search than can be continued with another task roll. Roll 2D6 after each attempt, on a result of 2-3, the controller looses contact with the drone. He or she will get one chance (and one chance only) to reestablish contact:

To reestablish contact with an undersea probe: Comms, Intelligence, 1D6 hours, Difficult (-2)

Success with the survey will reveal hidden treasures. The searchlights will pick out yellow orange colour on rock outcrops which almost certainly represent alien microbial life, some sort of algae.

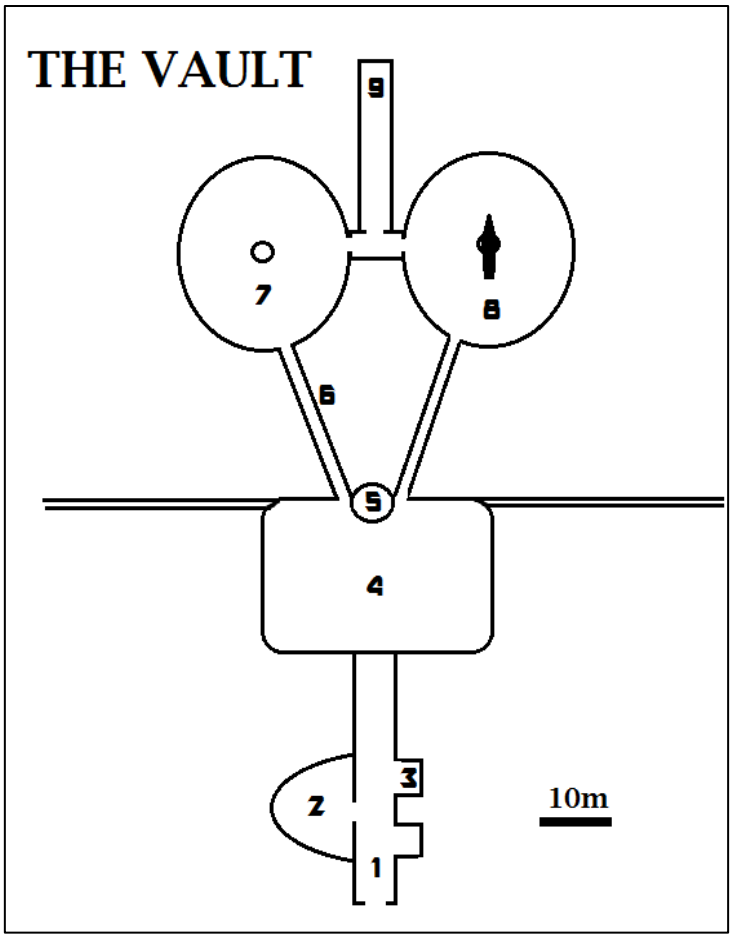
Should a second success be made then the probe encounters much larger patches of algae which seem to be getting larger as the probe continues, until the cameras pick up a shocking sight – a vast cylinder of metal. It almost looks like an empty rocket body, a vast hollow cylinder without end walls. There are no markings, but it is certainly artificial, grey and silver in colour, 30m in length and some 9m in width. About halfway along is a circular hole or hatch in the body of the metallic object. Further searches of the seabed will not reveal any other alien artifacts.

Site 66: Southern Craters

The north pole of the planet has suffered intense bombardment from meteoroids and asteroids as Tartarus ploughed through space for millions of years. Here, further south, however, is a another region of cratering.

Landing here the explorers can investigate the craters, the crater walls and their floors to investigate why the region was struck by large meteors. The truth is that Tartarus' moon was dragged along by the stardrive, but that its final orbit proved to hopelessly unstable and within a century it broke up with large fragments striking the surface along the equator. The craters, when investigated, prove to be extremely old - around 800,000 years old.

THE VAULT



The explorers have no real way of knowing, but the Vault is a scientific station (in fact Tartarus was a scientific research colony). The Vault was one of the early test sites for the principles of the alien stardrive. Little remains today, but the explorers may be able to recover from the site two things of value: 1) A scale model of the first stardrive unit (it does not work, i.e. It is non-functional) and 2) A holographic recording that explains the stardrive disaster and catastrophe that befell the planet.

The map below indicates the main parts of the vault. The first thing explorers come across is a door of some metallic element, cracked and bent, snow fills the tunnel beyond, but only for 5 or 6 m. Tunnel walls, and the walls and ceiling of the Vault in general are made of blocks of some artificial stone. The entire structure suggests an engineering TL equivalent to that of Earth. The following locations are marked on the map:

1 **Main Corridor**. Pitch black, filled with snow for 6m, this 45m corridor ends in another metallic door. A semi-circular chamber (2) leads off to the left, and two alcoves can be found on the right (3).
2 **Semi-Circular Chamber**. Twisted metal poles, broken stone blocks and brown sludge fill the room (the sludge is a million years of decay of metallic and all other artificial products).
3 **Alcove**s. The first is empty. The second contains brown sludge and 4 hexagon markings on its back wall.
4 **Hall**. To enter the hall a metallic door must be passed. It is not locked but is partly decayed and jammed in place. Any extreme force will cause the door to disintegrate. The large hall beyond, is lit only be the explorer's torches. There are markings on some of the walls (see the illustration titled 'Script'). A dais in the middle of the far wall holds a badly eroded hatch to some lower level, on either side of this dais are two narrow corridors. In the centre of the hall are some black and blue electronic devices mounted on to desks of stone blocks. Fiddling with one will activate it. There is a trickle of power here from the last remnants of a fission reactor buried beyond (9).

Once alive blue lights flicker through the hall and begin to strobe rhythmically. A tortured screaming begins, and seems to accompany a flickering holographic movie. *It shows a machine lit up with green light mounted inside some vast cavern, shadowy figures move about attending to controls and giving some sense of scale. The green lights suddenly flare*

the machine is working and glowing with energy. The figures catch fire, the hologram turns bright green. Cut to an overlay of a star-system, a single yellow star and three planets. The outermost planet disappears to appear much further out on the rim of the system. The image flickers again and the planet moves again, even further out. Then the image fades and the hall once again goes dark. This is a recording of the stardrive event and the explorers should easily be able to piece that fact together.

5 **Rusted Hatch.** The hatch is hold and decayed, ladders that will collapse if used drop down 5m to a tunnel running at right angles. It leads off in both directions and is filled with brown sludge and various undulations; decayed lumps on the wall and ceiling show it was used for something. This is a fruitless exploration designed to slow down the characters. Each tunnel leads for 650km, although at several places tremors have shifted the walls, causing rock falls and collapses, in some places pinching the corridor almost shut.

6 **Connecting Corridors**. Two corridors connecting the hall to two large hemi-spherical chambers.

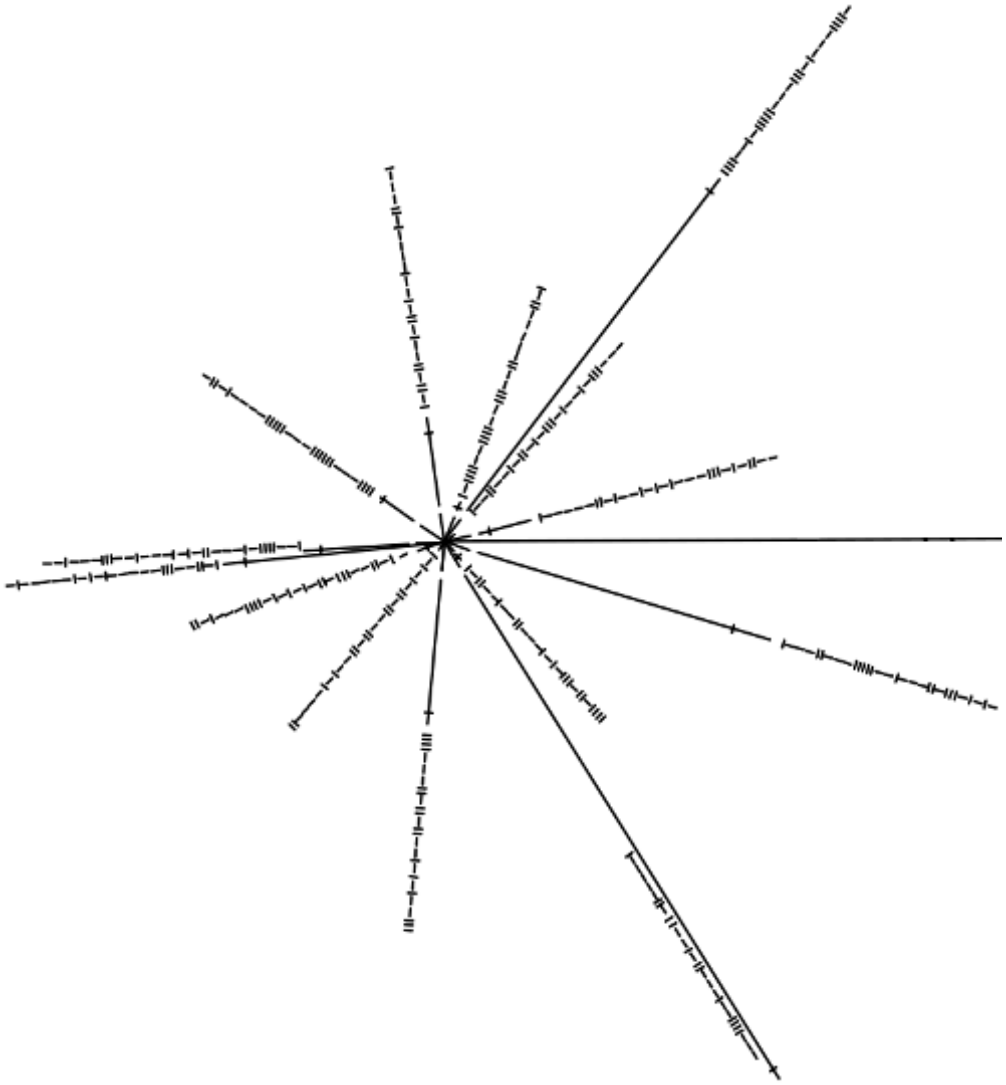
7 **Hemispherical chamber (7)** is empty except for a dais and various rotted brown bits of pipework and machinery.

8 **Hemispherical chamber (8)** is identical, except that it has some kind of machine on the dais. Badly corroded it resembles the vast machine bathed in green light in the hologram. This version is only two metres long and can easily be removed from the dais.It is extremely fragile, though, and bits will break off or turn to powder unless the team are not careful.

9 **Short Corridor.** This leads to a mass of decayed controls and stone benches, all is sludge and brown unidentifiable lumps. Radiation detectors will pick up here, beyond the end wall (although the players will not know this) are the faded remains of a fission reactor pile used once to power the complex and its experiments.

THE BUILDING

The explorers have knowing but the Building was once an astronomical centre and observatory. Explorers will have used the ice tunneler to get down to the ruins, which will appear to them as wall lines of artificial stone blocks. Destroyed by the weight of ice upon them, the buildings only survive as wall stumps, generally only 1m in height. There are no walls higher, nor are there any ceilings. In the area uncovered by the tunneler, the explorers will find frozen brown sludge, grit and some large fragments of curved polished glass. On parts of a twisted bronze disc they find enigmatic inscriptions of hexagons and circles (see the illustration titled 'Script'). They will also find, carved onto metal that seems to be an alloy of titanium, a chart. It roughly resembles the chart below. That is a map showing Earth's location relative to fourteen known pulsars (the stellar 'lighthouses' of interstellar space). The lines emanate from the same origin and have corresponding long binary numbers, which stand for the periods of pulsars, using the hydrogen spin-flip transition frequency as the unit. The lengths of the lines show the relative distances of the pulsars to the Sun. A tick mark at the end of each line gives the Z coordinate perpendicular to the galactic plane. What the player characters have found is a corner of an interstellar observatory, and the titanium disc holds a similar map, triangulating the home star system of Tartarus relative to nearby pulsars. With this information, a decent astronomer can calculate the most likely origin of this rogue planet, and the home of the alien civilization.



Based on the trajectory already computed by astronomers of the International Astronomical Union back on Earth, and on the data gained in the Building, it becomes clear that Tartarus was once a small planet orbiting Tau Ceti, a G-type star 12 light years distant from Earth. There lay another planet, the home world of the aliens. What became of them? Tartarus travelled at an average interstellar velocity of 157,600,00 km per year and its journey to the Solar System has taken it 723,310 years. What remains of the home planet? Of the intelligent civilization that flourished there and set up this advanced technical colony on Tartarus? They were threatened by some other alien race… did they succumb? Or did they fight off that menace? We must assume, perhaps, that they did not pursue the stardrive in the years and centuries that followed, else they would have caught up with the errant planet, and indeed, with Earth.

4 – STILL IN ORBIT

Much of what happens on the surface of Tartarus, the exploration and discovery of a lost alien civilization, makes up the bulk of the game. However, although it helps to establish the setting and provide lots of opportunity for danger and misadventure, the biggest challenge facing the characters will be in orbit.

The Alien AI
Hidden away, deep in a central scientific base (unseen and undiscovered by the explorers), sits the artificially intelligent computer that was tasked with managing the stardrive project. Now, this computer is light years ahead of technology on Earth in 2100 AD. Perhaps it uses meson technology to communicate with other centres or approaching alien spacecraft. The AI understands that the stardrive project was developed as part of a strategy to defeat a threatening alien race. The AI also controlled all operations of the prototype stardrive.

As the team descend to the surface in the lander and begin explorations at their chosen site, the AI will begin to try and communicate with the Far Horizon up in orbit. It recognizes CASS as a primitive version of itself, but will have real trouble in communicating with such a primitive computer.

The crew on board Far Horizon will find that CASS is following the AI's instructions, but will not be able to trace these commands and CASS herself will not be able to sensibly explain where the commands came from. This will cause problems, and as the commands get more extreme, the Far Horizon and the team on the surface will face extreme danger.

The First Problems
The AI will begin communicating with CASS as the lander starts to descend to the surface. CASS will receive the instructions or communications into her 'command buffer' but has no idea how they got there, she assumes they are from authorized sources (mission control or the crew, for example).

Garbled communications and a complete mismatch in language will result in random commands sent to the spacecraft. Odd things will happen at CASS's direction. Of course the crew will assume CASS is going crazy, either malfunctioning or 'doing a HAL' (that's a 2001 A Space Odyssey reference, a movie that is certainly a recommended watch!) Whilst the landing crew deal with their own problems and challenges, the crew left in orbit will be dealing with more and more erratic computer behaviours, behaviours that will cause them to question the reliability of the ship's mainframe.

The referee can slowly reveal these errors and problems to the crew, and as they investigate one he or she can drop another one on them. At some point they will turn to CASS either for a solution, or as a probable cause of the errors.

- ***Error 1***
  All lights on the hab deck go off. The electrical system for the hab needs to be rebooted.

  To repair malfunction: Computer, Edu, 1D6 hours, Routine (+2)

- ***Error 2***
  The recycling system begins to switch off every three hours, but can easily be switched back on again.
  To repair malfunction: Computer, Edu, 1D6 hours, Average (0)

- ***Error 3***
  All doors lock. They do not unlock. This is very serious and someone is going to have to 'rescue' trapped individuals by dealing with each door one by one.

  To repair malfunction: Computer, Edu, 1D6 hours, Difficult (-2)

- ***Error 4***
  The Far Horizon begins a trajectory change, lowering the orbit by 25 km (from a low orbit of 200km).

  To repair malfunction: Computer, Edu, 1D6 hours, Difficult (-2)

- ***Error 5***
  The reactor locks into a self-check mode, in this mode the main reaction drive cannot be used.

  To repair malfunction: Computer, Edu, 1D6 hours, Difficult (-2)

Interrogating CASS
CASS can be interrogated via her voice interface, but the crew might also want to delve into her system files to try and understand what is going on.

To detect mainframe malfunction: Computer, Edu, 1D6 hours, Average (0)
If successful the PCs can safely say that CASS is operating at 100% efficiency.

To find evidence of the 'strange commands': Computer, Edu, 1D6 hrs, Average (0)
If successful, an obscure log of the commands can be recovered. The log does not state the origin, only the time and the order itself. Each is given an approval stamp by CASS because (she says) the order bypassed all security protocols as if it had been cleared through the normal password system.

To find the origin of the commands: Computer, Int, 1D6 hrs, Formidable (-6)
Failure is likely. Success will not give the complete picture, but after eliminating all kinds of possibilities and after reference to various technical manuals, the PC might concur that CASS is being contacted by some agency, using a radically different method of communication. That is as far as any research is likely to go, though. Such a method might be a type of meson communicator.

5 – THE STARDRIVE

This forms the climax of the scenario. Everyone is now vulnerable and struggling either with some physical task on the surface of Tartarus, or with trying to identify the errant (and dangerous) commands on board Far Horizon.

With no response from CASS, the alien AI decides that Far Horizon is in all probability an agent of the hostile alien force that the stardrive was first designed to counter. The AI decides to attempt another stardrive jump, shifting Tartarus several thousand km in the direction of the north pole. It is another failed jump, just like the other jumps that Tartarus made as it skipped passed the Solar System, thus attracting the attention of scientists back on Earth.

Effects on People
Being stuck in orbit or on the surface when the stardrive activates will not be instantly fatal, but may have very unwelcome repercussions. Everyone (in orbit or on the surface) will suddenly have an overwhelming and incapacitating attack of motion sickness or vertigo. It will be accompanied by flashing lights on the retina and prove crippling for 1D6 rounds, with each individual making an Average (0) Endurance roll to avoid being violently sick. This could be extremely dangerous inside a vacc suit, since it could obscure the visor.

Effects on the Spacecraft
Tartarus has suddenly shifted 2267km northwards, leaving Far Horizon trailing in a new orbit. If Far Horizon had been in a low equatorial orbit then it is now orbiting in the southern latitudes at a much higher altitude (let us say 500km). If Far Horizon had been placed in to a low polar orbit by the crew then it is now in an unsustainable elliptical orbit around the poles, and finds itself at a higher altitude (again let's assume 500km and in the southern latitudes).

The player characters will not initially know what has happened, warnings, sirens and lights are all clamouring for attention, the Far Horizon bridge will be a place of chaos. The ship will appear out of control and spinning, stars sweeping past the wide cupolas.

To determine cause of control loss: Pilot, Int, 1D6 minutes, Difficult (-2)
Once successful (and understanding that either the ship has moved, or the planet has moved) the crew must quickly determine the ship's new position, only once this is successful can a burn be initiated to stabilise the orbit!

To determine position: Navigation, Int, 1D6 minutes, Average (0)

Both orbital situations (equatorial or polar orbit) will wreak havoc with CASS's guidance systems and the orbit will quickly decay. It is with the utmost urgency that the crew on board initiate a main drive burn to re-establish a stabilised orbital trajectory. If the crew are currently struggling with Error 5 (and any decent referee will wait until Error 5 crops up before throwing the stardrive at them!) this is easier said than done.

Give the PCs two and half hours before the Far Horizon crashes into the surface of Tartarus (it will not burn up, since there is no atmosphere).

6 – GETTING HOME

The rendezvous with Tartarus can last only 4 days (96 hours). If the Far Horizon begins to leave orbit within that 96 hours, then it will safely arrive within the Inner System. Every hour that this is exceeded interferes with this calculation.

To calculate a course back to Earth: Navigation, Education, 1 hour, Routine (+2)

Use the following DMs:	
1-2 hour delay	-1
2-4 hour delay	-3
5-8 hour delay	-5
9+ hours delay	-8

If successful the Far Horizon can navigate back to the Inner System (Earth, Mars, etc. in two and a half years). Failure indicates a detour, or worse…

Degree of Failure	Result
-1 Marginal	Extra six months added to voyage home.
-2 to -5 Average Failure	Ship must rendezvous with a Kuiper Belt object in order to refuel. It will reach the Jupiter system in 4 years or the Inner System in 5 years.
-6 or worse Exceptional Failure	At the speed it is moving while orbiting Tartarus at this late stage, a return burn does not have enough delta-V to return to the Inner *or* Outer Solar System. Far Horizon is now, tragically, in a parabolic orbit and will continue to coast, out of fuel into interstellar space. Adieu.

Whatever the fate of the Far Horizon, remember to give the player characters the result of their mission, based upon the data they added to the Mission Record Sheet.

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