

# LFM 3-80

**Lunar Field Manual  
No. 3-80**

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LCA Field Office, Department of the USSF

## FOREWORD AND UPWARD

Since the establishment of the USSF, it has been our mission to secure space for mankind. To establish humanity's place among the stars. Following the directives of the Artemis Accords and subsequent missions, I feel we have taken those critical first steps. But the mission continues, and if you are reading this you're part of it. I'm reminded of the words of pioneering astronaut Buzz Aldrin, "*I know the sky is not the limit because there are footprints on the Moon.*"

For those of us who've left our own footprints, the world will never be the same. I wish you well and I wish you luck in your endeavors.

*Aldous "Huck" Shepherd*  
**ALDOUS H. SHEPHERD**  
Major General, USSF  
Commandant  
Lunar Special Operations

## MISSION STATEMENT

With the Space Commerce Free Enterprise Act and Artemis Accords in force, a joint operation of the private sector and government agencies began work on orbital and surface lunar bases, The Shepherd's Gate and Central respectively. The gate is responsible for incoming and outgoing traffic as well as atmospheric research. Central's mission is likewise simple, provide the basic infrastructure necessary to support the expansion of new colonies on the lunar surface.

In the long term, the goal is exploration, commerce, and habitation beyond Earth's orbit. Civilian Contractors on the moon are the pathfinders of this bold future. In this, both the private and public sector are in agreement.

*Roberta M. Hadley*

Governor, Luna Civil Administration

*David Saloman*

Chief Counsel, WRMC

*Aldous "Huck" Shepherd*

Major General, USSF

# SPACESUITS

They say that clothes make the man or woman as the case may be. Nowhere is this more true than in space, there are times where you may relax of course. But when you're out working on shielding, checking conduit, or surveying new plots. You're going to need a suit. And you're going to need a suit to get there in the first place. So, now we're going to go over the basics of your suits.

## Starliner Spacesuit

First there is the Starliner, designed to move civilians comfortably and safely from Earth to their final destination. It's lightweight and durable, unlike some suits you won't feel restricted wearing it.



## Z3 PS Spacesuit

The Z3 is the latest Planetary Surface Spacesuit in production, developed to give contractors the protection they need on the job with a bit more comfort and mobility than the more long term option.



Each suit can sustain an active adult for 4 hours in the field before needing servicing, so be sure to keep an eye on the monitoring system. Either way, that gives you enough time to get your job done and head back for lunch while systems are restocked.

## EMU Rev 2 Spacesuit

The Extravehicular Mobility Unit is more complicated than its little brother the Z3, but the EMU is also capable of operating for twice the time and in harsher conditions. If you are surveying a remote crater or servicing remote operations this is going to be the suit that gets you back home in one piece.



**NOTE:** Whenever you're instructed to wear approved personal protective gear to perform maintenance, this is the gear the manual is talking about.

# ESSENTIALS CHECKLIST

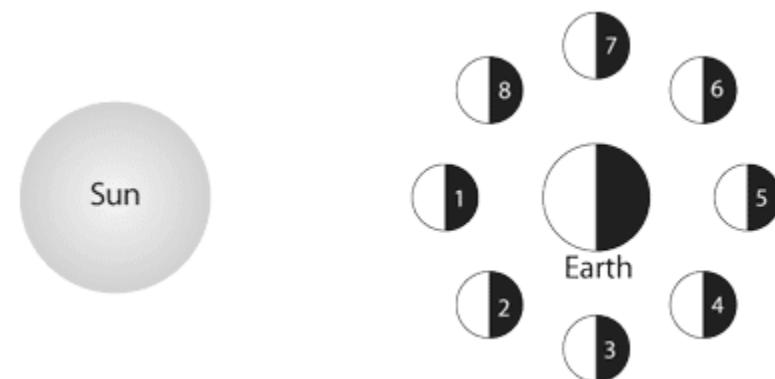
Below is a list of the contents of the Luna Homestead Kit, these are the building blocks to continued existence on the lunar surface.

- Habitation Module
- Solar Array
- Stirling Engine
- Power Accumulator
- ISRU Refinery
- Drone Hub
- MFS Drone(s)
- Vulcan ESM
- Prometheus Turret

Basic living accommodations are provided by the World Resource Management Council and distributed by the Luna Civil Administration, with the assistance of Opes Sky Industries LLC in the form of the *Luna Homestead Kit*. Civilian Contractors will need to establish residential operations immediately upon acceptance of land parcels in accordance with the Lunar Repatriation Act and the Lunar Civil Services Act. The purpose of this document is to acquaint new Contractors with the equipment and to give you a rough idea of what to expect as you establish yourself on the lunar surface.

# THE NEW NORMAL

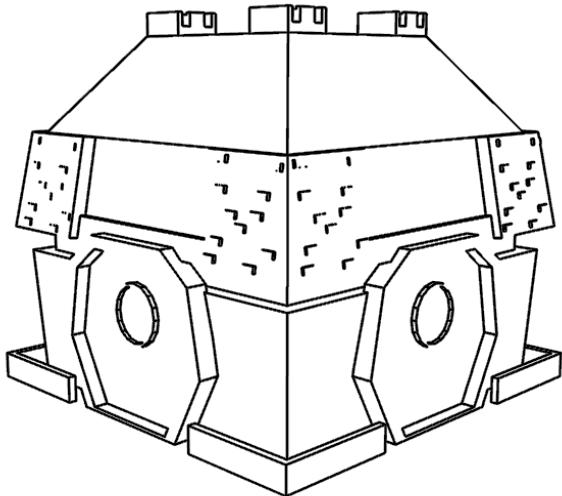
Depending on how you choose to look at it, time is not exactly on your side while on the surface of the moon. A full day/night cycle on the moon is roughly 24 days on Earth. Acclimating to Lunar Time should be a major concern from day 1. The only way to really cope with this cycle is adherence to a sleep schedule.



Three blocks of eight hours each is a solid starting point. Reserving the final eight for sleep. The remaining two blocks can be divided as needed, just remember to leave room not just for work but also for recuperative leisure and self care time. Never forget what it is you're working so hard for after all.

## Habitation Module

Home sweet home, be it ever so humble. The module was created and adapted by Galle-Thames Group; they've designed it to be easy to deploy, yet sturdy enough to keep the depths of space out of your hair. Heat is generated as a byproduct of day to day operation, so you'll want to get to work early unless you enjoy cold showers.



In a word, Spartan best describes the living space provided. There's room for a place to sleep, to eat, and limited recreation. Fortunately, you can always add more modules as needs and capabilities permit.

## Your First Day

It's normal to be nervous on your first day, and day one is probably the hardest. You can live entirely out of the Habitation Module, but I wouldn't call it thriving. You've got your bed, a place to prepare and grow some simple food. Even a Fabricator, perfect for replacing your favorite coffee mug.

You're going to want to get into the swing of things as soon as possible, but don't push too hard. Stick to the checklist, make sure all the equipment is present and working. Familiarize yourself with your surroundings and the work you'll be doing alongside the drones. And start building your new life, one building order at a time.

And remember, if you need anything we're here to help.

*Roberta M. Hadley*  
Governor, Luna Civil Administration

# POWER

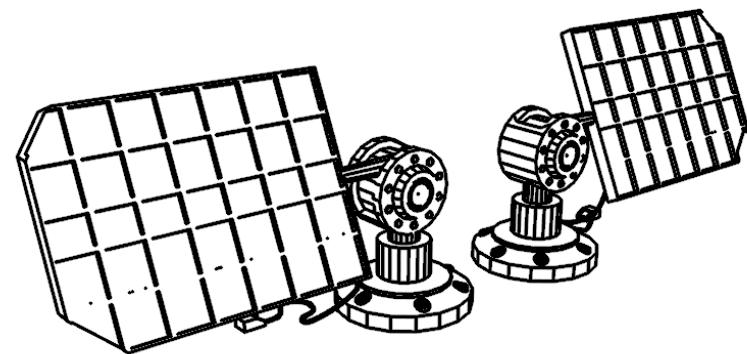
Your homestead needs power, fact of life. Extra terrestrial operations offer certain challenges, on the moon this comes in the form of day and night. As mentioned earlier, the day/night cycle on the moon is equivalent to 28 Earth days. During the day, you can expect temps in the area of daytime temperatures tend toward 250 degrees Fahrenheit (120° C, 400 K), and when night falls the temp drops to -208 degrees Fahrenheit (-130° C, 140 K). A challenge to be sure, but also an opportunity not available on Earth however.

## Solar Array

Development of high output perovskite solar cells was a game changer in terms of extra terrestrial settlement. Fabricating the material is cheaper on the lunar surface than it is on Earth. It's lightweight and easy to shape and integrate into existing structures.

This has made perovskite one of our major exports in one form or another. As well as a major source of usable power on the moon. Notably in the Solar Array.

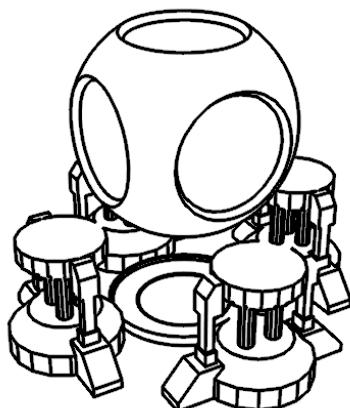
Despite the obvious benefits, the solar array is not without limitations; as you may have already guessed the main problem being that night time on the moon lasts for two weeks. So, you're either going to need a robust solution for storing excess power to get you through the dark or you're going to need something to pick up the slack.



Still, while the sun is visible the Solar Array allows for consistent hassle free energy generation.

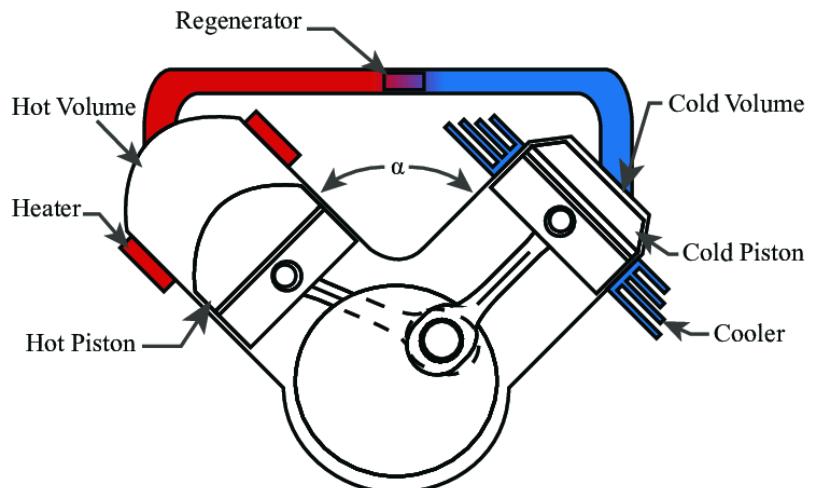
## Stirling Engine

In 1816, Scottish Reverend and Engineer Robert Stirling applied for a patent to a new kind of machine, a generator that used heat differentials to turn a wheel. It works a lot like any other electrical generator, with one key difference. At no point is combustion involved.



There are two types of chambers with their pistons, the hot and the cold. Both are filled with a volume of gas, in our case Helium 3. One set of pistons is heated by Plutonium at a consistent rate. While the other is cooled by lunar nighttime conditions. Advances in exotic alloys and miniaturization that were clearly unfathomable to the good reverend result in consistent power generation with

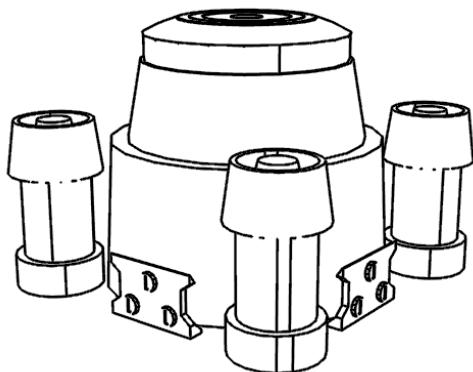
low noise, and low impact on the surrounding environment. The completed Engine is of course a marvel of modern engineering, however ambient conditions in Earth's atmosphere would render it inert.



**SAFETY NOTICE:** Plutonium is radioactive and requires personal protective equipment and protocols when handling. Though the system is self-contained and shielded, it is advised caution and care be used when servicing equipment. Structural and functional modifications to the system are prohibited.

## Power Accumulator

These high density accumulators store large amounts of energy by sipping at the flow from Generators under your control. Charged accumulators can then rapidly deploy energy when and where it's needed. Giving you critical time for repairs and maintenance.



It's not totally inaccurate to think of them as rechargeable batteries. Incredibly sophisticated rechargeable batteries, but batteries all the same.

## THE GRID

The various parts listed here, in conjunction with more advanced systems we will discuss later make up the power grid for your settlement. During daylight hours Solar Arrays generate power, which is then transmitted through utility storage of Power Accumulators, then distributed as needed throughout the complex settlement.

During night time hours where sunlight is not accessible, Stirling Generators produce the needed electricity that flows through the same grid. Power Accumulators ease the transition, while also providing protection in the event of maintenance or unforeseen circumstances.

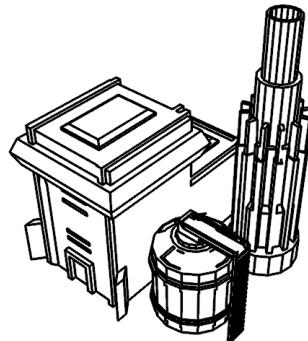
Managing this grid, maintaining it, and expanding it are critical for continued operations and growth.

# PRODUCTION

The main purpose of colonization is mining and manufacturing.

## ISRU Refinery

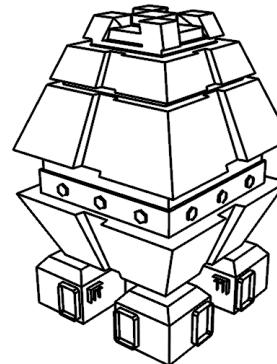
The Refinery reflects a sea change in doctrine, taking everything you need to survive and thrive with you into space is a fool's errand. Hence the acronym, In-Situ Resource Utilization which means using the resources on hand, rather than carrying your house on your back like some space turtle.



The early version of the refinery was called the Dust to Thrust machine, now it's far more than that. You can fabricate complex circuitry, tools, parts and of course fuel. The refinery helps you break it down so you can build it back up, better than it was before.

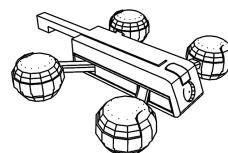
## Drone Hub

Once power generation is no longer a problem, it's time to really get to work. The Drone Hub is going to be your new best friend.



This is where the drones receive maintenance and service, as well as modifications if you're so inclined.

## MFS Drone(s)



The latest design from HoneyBee Robotics the Multi-Function Service Drone is one of the most important parts of the whole operation, they can work in places you can't, and they can do it while you're otherwise engaged.

## Vulcan ESM

The Vulcan uses electrolysis to sublime frozen regolith, that's the stuff under your feet if you've forgotten. Daytime temperatures on the surface reach 250F, in the dark it's under -200F. Not only is that a broad range, it's a problem for anyone trying to get any work done.

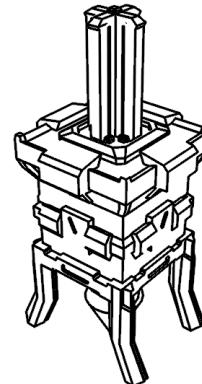
There's a lot of water beneath the surface, which is good news because you'll die without it. Bad news is, it's all frozen. As the drill works its way through the crust and deeper below the surface, a strong electrical charge vaporizes the groundwater. The vapor would normally be considered waste, but it's valuable to us so we collect it and store it at a usable temperature elsewhere.

Meanwhile, the process exposes various raw materials to be collected by the drones for processing. Of course, this whole thing requires some logistics, the drones are tough but not tough enough to take the full force of the Vulcan. So, AI keeps them both coordinated as they work, which is as good a time as any to remind you to keep your firmware up to date. Consequences could be severe.

**SAFETY NOTICE:** Contractors should not for any reason enter the extraction zone regardless of drill position without first notifying Central, and disabling power relay to drill.

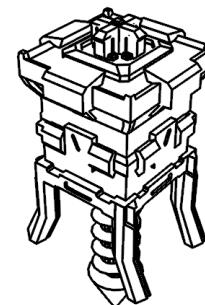
## Fig 1. Safe Position

Drones may enter when the drill is in this position.



## Fig 2. Not Safe Position

Drones will not enter the extraction zone in this position.

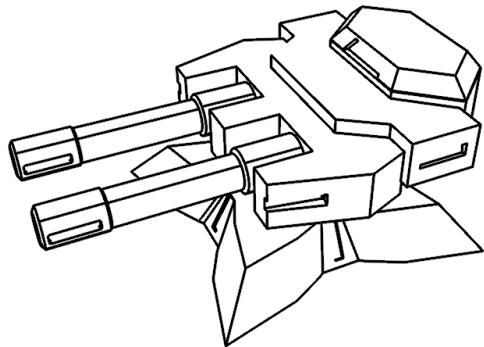


# DEFENSE

Protecting your piece of the pie is a real concern despite the relative remoteness of space, not everybody wants to play nice. The second two people started building something, one of those two got the idea to let the other one do all the heavy lifting and take it from them afterward. So, we're not sending you up there empty handed.

## Prometheus Turret

The Prometheus is the latest Direct-Energy Weapon from Marietta Allan Corp. The Terrestrial Operations Division saw the need for a way to deny bad actors from rival corporate and state interests as a real necessity.



There are two major factors that make this weapon so attractive to contractors. First, there's accuracy, this is due to

the near instantaneous speed of the beam, and the nature of light itself. Practically speaking, these guns are unaffected by gravity, solar winds, or Coriolis forces. And of course, proprietary innovations of Marietta Allan that have done wonders to preserve beam intensity and integrity.

Secondly, there's the logistics to be considered. The Prometheus turret doesn't require ammunition. On your first day in your settlement, you'll be generating power and storing it. That is your ammunition. Eliminating the need to produce ammo and deliver it on site. This reduces cost dramatically. For many in remote operations, this is the fire and forget solution we've all been waiting for.

**SAFETY NOTICE:** All Prometheus Turrets are issued with inhibitors as a safety precaution, making the beams work at short range only and effective only against mechanical targets. This is for the safety of all contractors in a given area. It is still however advisable that all contractors avoid standing directly in front of the aperture(s) at any time the device is powered.

Tampering with the inhibitors is prohibited and a direct violation of contract terms.

## EXPANSION

Now that we've covered the basics of what you need to survive, let's give you the tools to thrive. Let's stick to the categories we know, with one additional category later.

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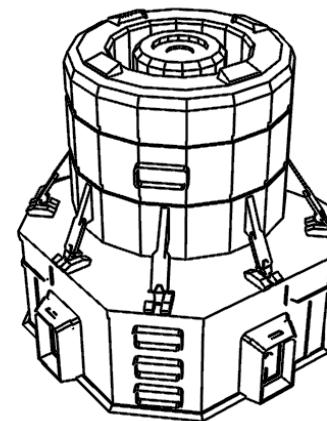
## POWER

According to Arthur C. Clarke, "Any sufficiently advanced technology is indistinguishable from magic." For decades that was where fusion technology neatly fit, to hear it explained now, it still sounds like magic. But, then you see it, and it works. And that's enough for most people.

It bears mentioning that mindfulness of Grid Balance is still a consideration. You still want to have enough redundant power to keep critical systems online in the event of regular service interruption. You still want to have surplus power in Accumulators if direct intervention is required. That said, once you've reached this point you're going to have more potent options for powering your day to day operations and less worries about keeping the lights on.

## Helios MIF Generator

The Helios uses Magneto-Inertial Fusion to generate vast amounts of energy. It combines aspects of magnetic confinement fusion and inertial confinement fusion. The trick to working with atomic power on this scale is keeping it contained, essentially a magnetic field is used to confine and control the movement of plasma within a chamber in the device. Power output is orders of magnitude greater than what's possible with either Solar or standard generators. Allowing for the surplus energy necessary for settlement to become civilization.



**SAFETY NOTICE:** Radioactive materials are present within the enclosure, so personal protective protocols apply here.

# PRODUCTION

The old saying goes, “the needs of the many outweigh the storage capacity of the ISRU Refinery” or something like that. Growth on the lunar surface necessitates more sophisticated solutions, and here we present those very solutions.

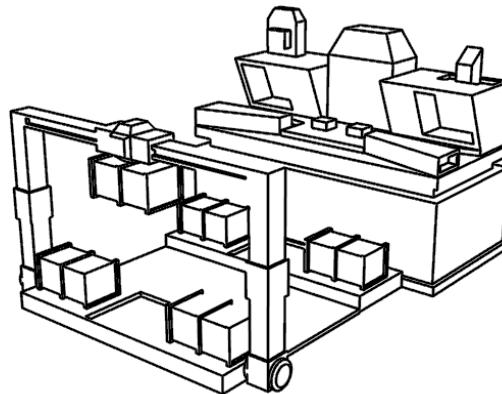
## Checklist

- Storage Depot
- Chemical Processing Lab
- Chemical Depot
- Water Silo
- Conservatory
- CO2 Scrubber
- Far Unit
- LX 600 Rambler

As settlement gives way to burgeoning civilization, you'll need more of some things than others. Choose your build orders wisely.

## Storage Depot

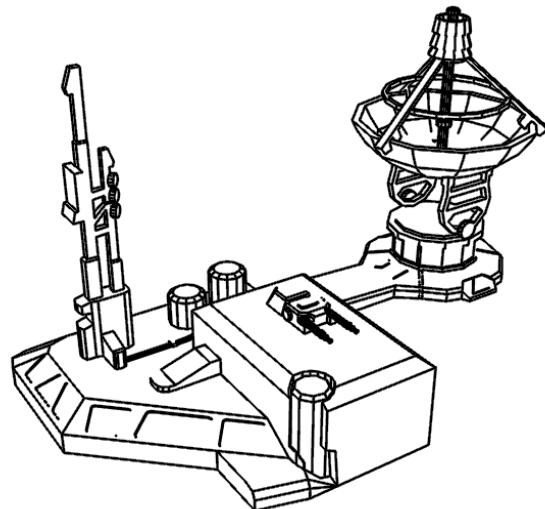
The surface of the Storage Depot is often a blur of motion, but the real show is below where reinforced and shielded containers are kept for long term storage, ready for recall at the press of a button.



It may not be all that exciting, but these fancy boxes are quite necessary for all the materials being harvested, refined, and sorted at industrial scale.

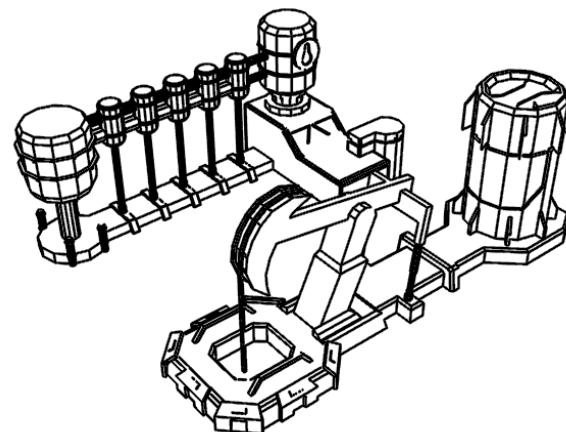
## Hermes Beacon

As humanity reaches for the heavens, connection to one another becomes less tenable. Communication between distant colonies however is critical, thus the Beacon's were created. The Hermes allows access to exotic imports from orbital mining operations and distant colonies, as well as first response against celestial hazards.



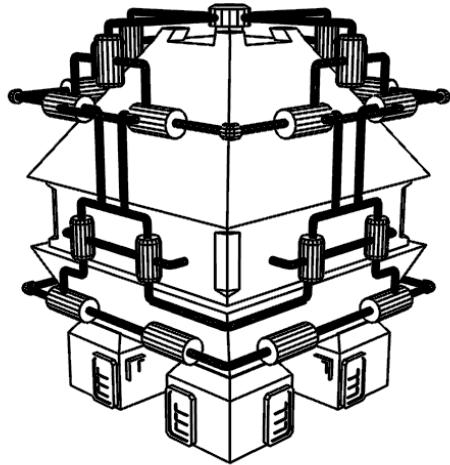
## Condenser Unit

These units are critical in the extraction of liquid fuels as well as water, due to ambient conditions temperature control is necessary to ensure these precious gasses don't revert to a solid. To simplify, make sure you know which liquid is which when you tap the output. Consequences for mistakenly drinking liquid helium are severe.



## Chemical Processing Lab

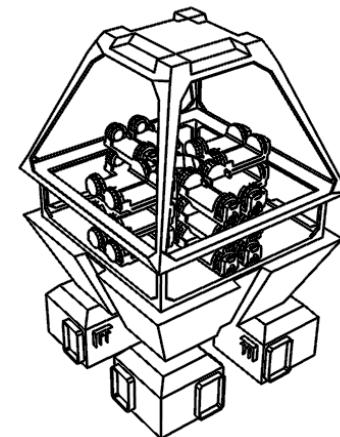
Many by-products of the Vulcan's mining process are gasses, two in particular of interest to operators here: Hydrogen and Helium 3. Of these various elements, many chemical compounds can be made. But it requires precision and a controlled environment.



In the end, you're left with stable containment of valuable resources, ready to be stored or further refined and deployed as necessary.

## Chemical Depot

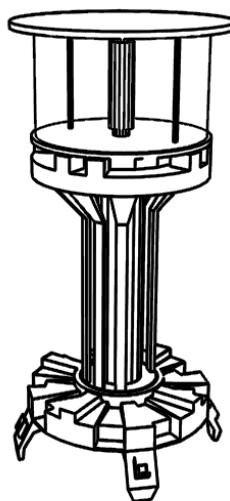
Much like the storage depot mentioned earlier, the Chemical Depot is for storage but specialized for managing and maintaining often unstable chemicals with varying needs.



Temperature and pressure control for example are critical with certain compounds, and protection from unforeseen impacts, say meteorites, is also more important than it is with other materials. Dividing storage this way is the epitome of not keeping all your highly valuable eggs in one basket.

## Water Silo

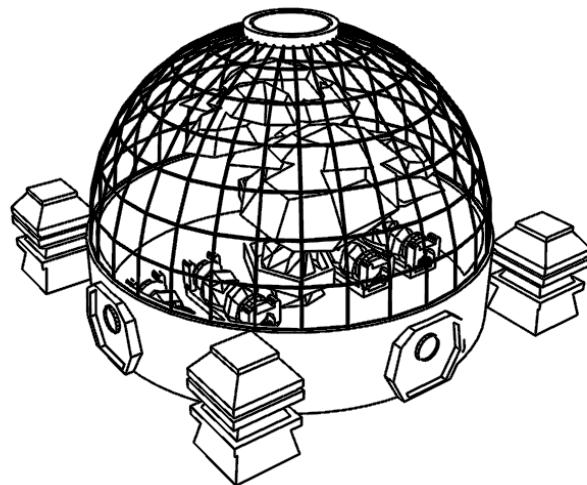
Besides breathable oxygen, drinkable water has to be pretty high on the to do list for anyone looking to live on the moon. Fortunately, both are a byproduct of the drilling operation. That means however, you're going to want a place to store it. And preferably one that has no chance of being mixed up for Helium or Rocket Fuel.



These water silos keep the water at a stable temperature of 70 degrees. Not too hot, not too cold. But more importantly, they keep it from freezing or boiling away.

## Conservatory

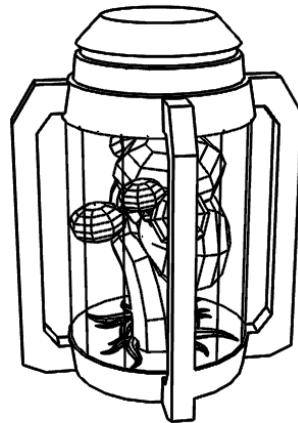
You may not realize it now, but after a while you want to take a moment to get back to nature. And frankly, it'll happen sooner than you think. Not only is the Conservatory a welcome sight, but it's also an excellent source of food, you can grow a lot of edible crops under the dome.



**NOTE:** Be sure to follow agri protocols to maintain soil integrity, otherwise you can end up with a bad case of nothing growing.

## CO2 Scrubber

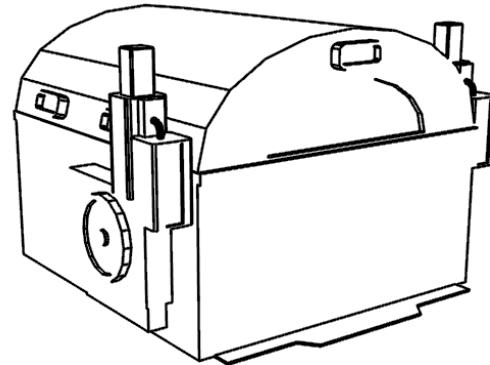
Everyone knows trees absorb carbon and release oxygen, but it's taken a while to realize just how important that is. Here we use the trees as a low-maintenance scrubber, keeping the air from going stale or worse becoming toxic. Trees from the conservatory and the scrubbers, passively sequester carbon and release it into the soil.



This helps the soil stay healthy for growing other plants. Meanwhile all of the plants release oxygen as they photosynthesize.

## Far Unit

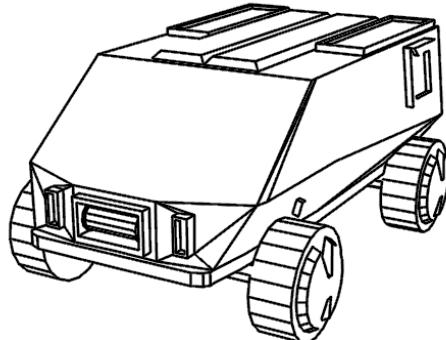
Gone are the days of launching Rovers into space at exorbitant costs, now they're built on site. Parts can be found on the market or fabricated at the ISRU Refinery, but when you need something repaired, replaced, or upgraded this is where it's getting done. And when not in use, the Rover can charge its cells here.



Subterranean storage options are available for those with diverse needs.

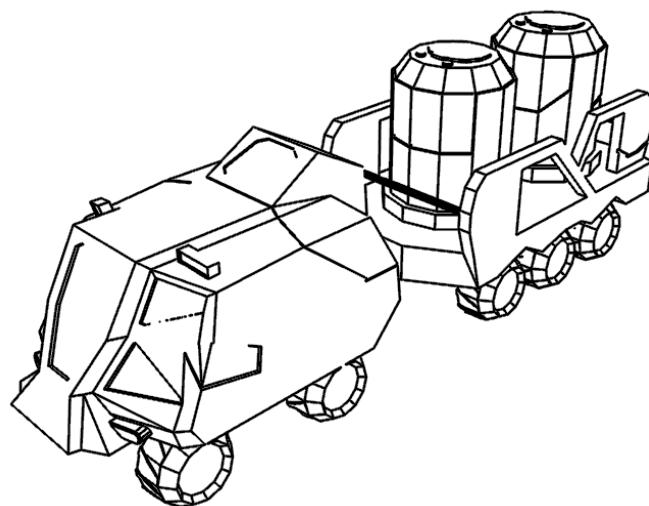
## LX 600 Rambler

Chiefly, this rover is for moving materials from point to point on the lunar surface. However, it does include equipment for surveying sites as well as 3d Printing equipment that can be used for emergency repairs. For those who must travel, the Rambler is a home away from home.



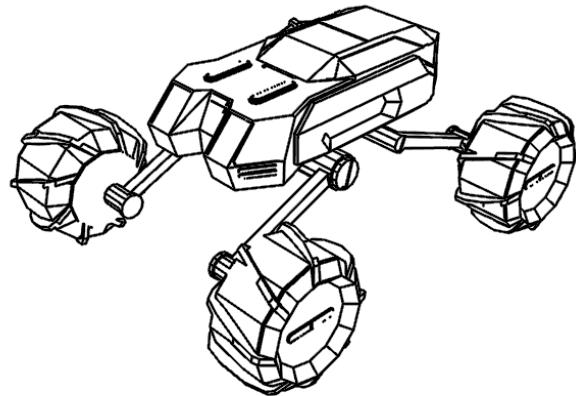
## SM Heavy Hauler

Nicknamed the Snowman by some guy from Georgia, the Heavy Hauler is the latest in the line of industrial cargo transport on the lunar surface. Due to reduced gravity, this truck can haul an obscene amount of cargo. Don't worry about the weight, if it fits in the trailer it will be moved.



## Bandit Recon Rover

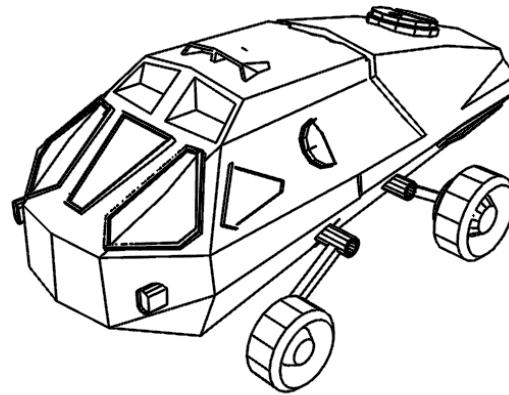
This light and fast rover is designed for agile reconnaissance, if you're in a situation where you need to move quickly through inhospitable terrain this is the way to do it. For surveying out of the way places there's just no better way, just don't expect to bring a lot of samples back with you. The rover comes equipped with a pair of drones to make your job a little easier.



If time gets away from you, don't be too concerned, there is space for you to stretch out and get some sleep on site, but only just enough so you probably don't want to make it a habit.

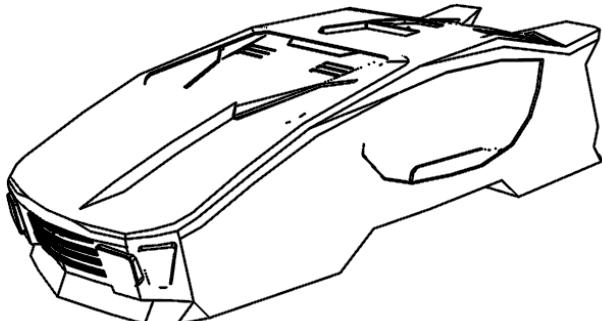
## Mimir Field Rover

The Mimir was designed for extensive research in the field, like the Bandit this model also hosts a complement of drones. However, there is also a more sophisticated lab for testing samples. With more sophisticated testing and experiments comes time, therefore the Mimir is better equipped for overnight stays in the field than the Bandit.



## Locutus LX

Wheels? Where we're going we don't need wheels. Or a steering wheel for that matter. The Locutus makes a statement wherever it goes. Quick and reliable, and connected to the civil mobile authorities systems. If you're in the city, enter your destination or say where you want to go with voice control active and you're off.



Locutus LX, say something.

## DEFENSE

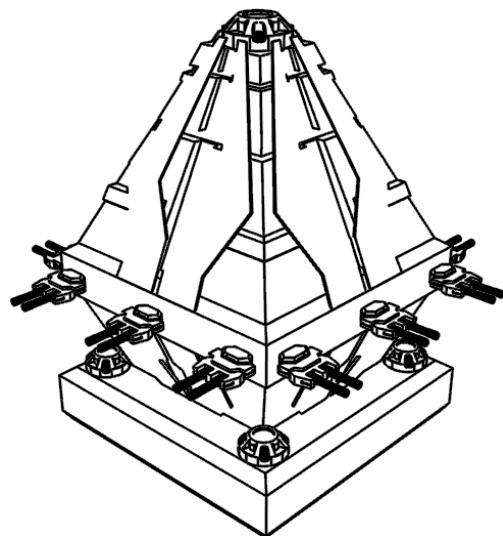
A lot of time and money has gone into making life on the moon a reality, the USSF and moreover the government at large and private sector interests intend to protect that investment.

- Tactical Operations
- EM Canon
- Lunacrete Walls
- EMF Turret
- Observation Tower
- Mjolnir Storage and Launch Bay
- RIM 238 Mjolnir

Now, understand we're not worried about little green men here, unless they're Packers or Jets fans. No, claim jumpers can be a real problem. So, be on the lookout. If someone's just snooping where they ought not be, report them to Central and we'll handle it. But if they get frisky, don't hesitate to protect your piece of the pie.

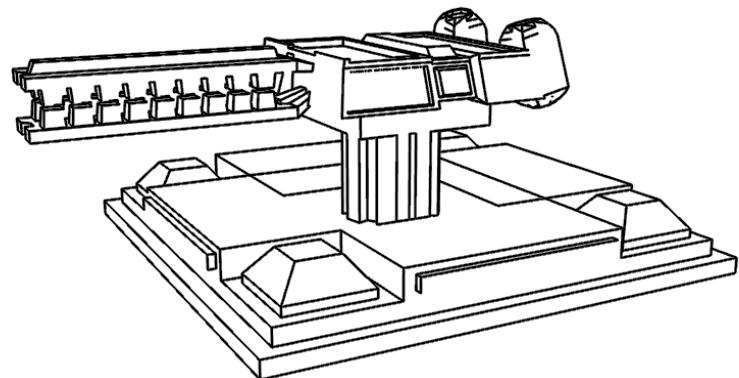
## Tactical Operations

Some believe that fire was man's first invention, others the crutch. More likely however it was a big stick for smashing others over the head and taking their stuff. The tactical hub is where the big sticks get made.



## EM Canon

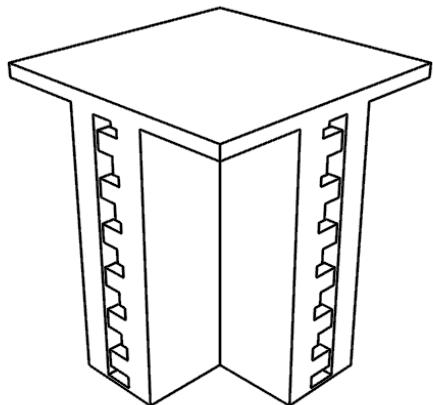
When I was a kid, I used to delight in hurling stones across the water. I never did much skipping, that needed the right stone and a bit more care than I was willing to put into it. Besides, my target was always the far shore. People have been in the business of throwing rocks almost as long as there's been stones.



The EM Canon is sort of the natural evolution of that need to huck a rock across the water, except it uses magnets to launch solid objects at distant targets with not only deadly accuracy, but frightening force.

## Lunacrete Walls

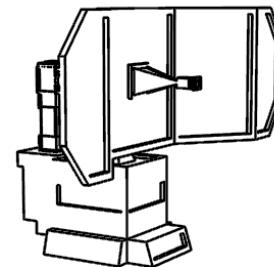
Walls are simple, but they do a lot of things all at once. For a start, they keep things in and they keep things out. They also send a message, in our case the message would be KEEP OUT. But building a wall in a low gravity environment, that's tricky.



Lack of gravity provides an odd problem for anyone trying to get over a wall, if you go too high you'll soon find yourself in orbit. Build the wall just high enough and you won't have to worry about any nosey neighbors asking for a cup of sugar.

## EMF Turret

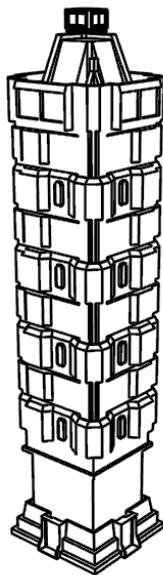
Sometimes I worry that the folks over at Research and Development are too clever for their own good, then they come up with something like this and I know they are.



This clever device uses directed Electro-Magnetic Field generation technology to disrupt the operation of electronic equipment. Due to safety concerns, this has been made to be temporary. However, it should provide the necessary breathing room for other munitions to solve any problems you may be experiencing.

## Observation Tower

It's easy to imagine that the positions of celestial bodies are fixed in the heavens, this is inaccurate. Space is full of motion, planets and their satellites in orbit, comets, meteors not to mention all of the manmade flotsam moving to and fro. Tracking these moving objects in real time is critical but also profitable.



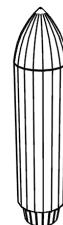
The observation tower offers early warning detection for the colony as well as aiding in extra terrestrial navigation for crews navigating the vacuum of space.

## Mjolnir Storage and Launch Bay

Falstaff said that "discretion is the better part of valor" and to some people this marked him as a coward. I on the other hand have always considered it one of those great truisms. Don't put your cards on the table unless you're ready to play.

With the Mjolnir, we're putting the deck on the table not because we want to throw down an ace of spades. But because we all sleep a bit better knowing we can if we need to.

## RIM 238 Mjolnir



Unlike missiles we think of on Earth, the Mjolnir does not include an explosive payload. Instead, it is solid, like a bullet. The reason is simple, with no atmosphere to fight against the high mass Mjolnir is capable of devastating damage on impact, without all the fuss about wind resistance.

At a certain point adding an explosive payload to one of these is gilding the lily and we passed that point back on Earth a long time ago.

# CIVIC STRUCTURES

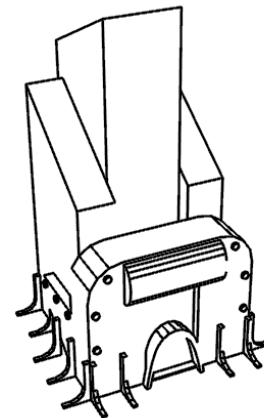
Civic structures are much what they sound like, recreational and necessary for mass habitation. At a certain point other people will be interested in seeing what you have to offer up here. And who would we be to deny them?

- Artemis Casino
- Nautilus Event Center
- Comms Tower
- Selene Resort and Hotel
- Medical Facility
- Longstrider Platform
- XNW Longstrider Rocket

Besides tourism, Civic structures also offer practical utility to the locals. I've been told that when you're in the business of staying in business it's usually a good idea to keep the locals happy.

## Artemis Casino

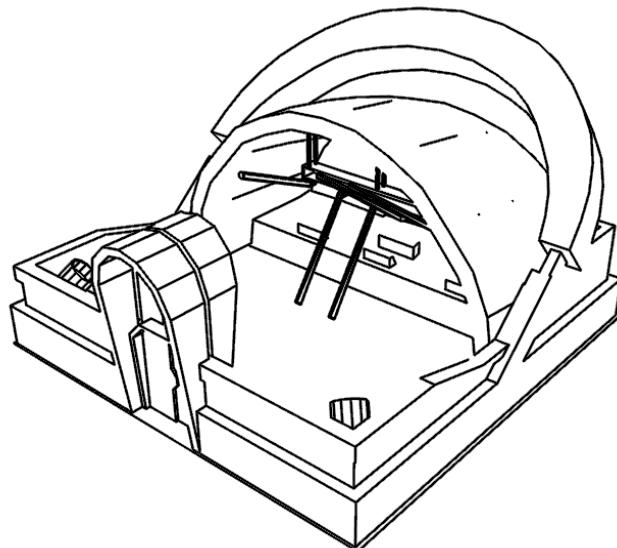
It may seem odd, even a bit vulgar to gamble on the moon. But really, it's a proud tradition going back to 1964. An Englishman named David Threlfell wrote to a bookie to place a bet. The odds were set, 1000 to 1 that anyone would land on the moon by Jan 1, 1971. In 64 it was considered a longshot by basically everyone. Basically everyone was wrong, and five years later a representative of the bookie presented Mr. Threlfell a check for 10,000 pounds (24,000 in freedom bucks).



Little wonder then that games of chance would find a foothold soon after man set up permanent residence on the surface of the moon.

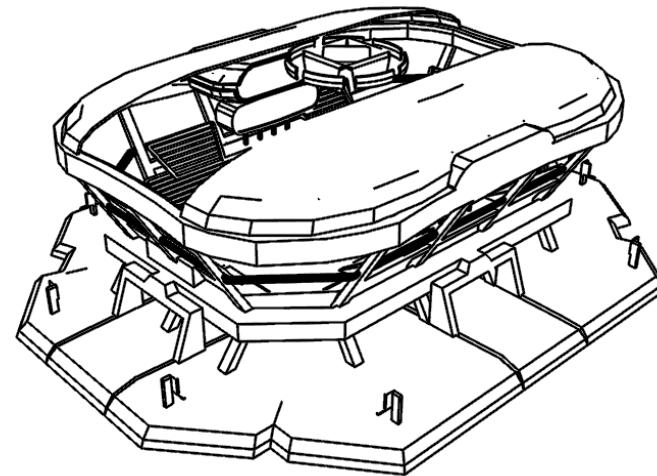
## **Nautilus Event Center**

Concerts, conventions, etc. Events such as these require open space for attendees. The Nautilus Event Center provides just that, as well as ambient enhancements such as banks of specialized lighting, a sound system, and fog machines. Of course, there are also catering areas and a well-appointed green room for visiting talent.



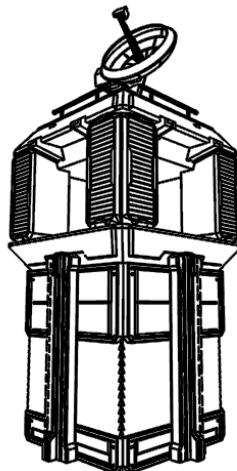
## **Ares Sports Arena**

With seating for 40,000 and accommodating multiple sports and events, this arena is ready for whatever you want to throw at it. Don't skimp on the concession if you want to keep those seats filled.



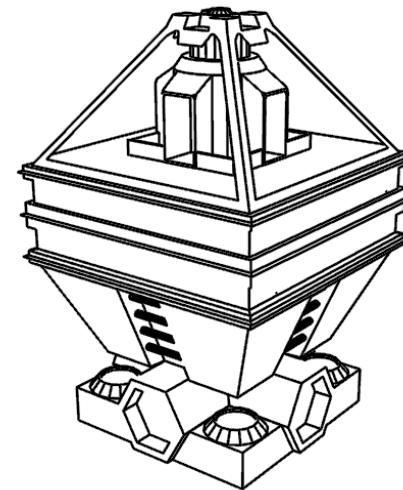
## Comms Tower

These towers act as a signal boosting relay for communication between Earth and outer colonies like what we have here on Luna. It also helps to be able to book events and visitors from Earth itself, you didn't think we were going to use carrier pigeons did you?



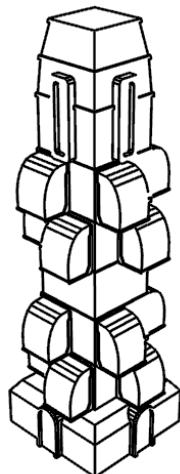
## Selene Resort and Hotel

The Selene brings the best of all worlds, modern amenities coupled with old world style. The Selene offers first class lodging whether you're here on business or pleasure. Take advantage of our convention hall, fine dining, spa treatments, even diversions for the kids. Offered by impartial, discrete hospitality droids.



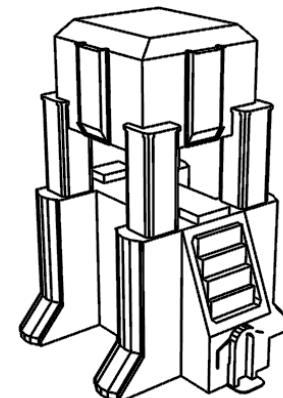
## **Resort Lodging Towers**

Offering stunning views of the depths of space and even Earth itself, each room is appointed for comfort and relaxation. Whether you're here on business or just to get away from it all. And don't be shy with room service, your wish is our command!



## **Medical Facility**

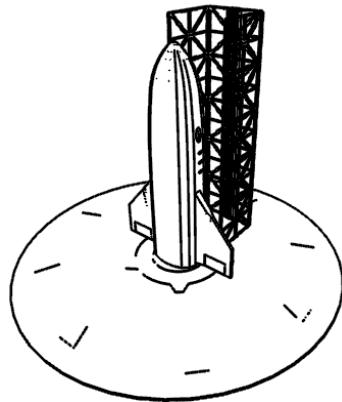
Accidents happen, that's why the staff of the medical facility are here. Modern facilities with the latest in recuperative technology await your needs. Just let us know how we can help.



The facility is supplied and capable of pretty much any medical procedure imaginable, however some patients may wish to be treated on Earth for a variety of reasons. For critical care, this is the place to go.

## **Longstrider Platform**

Remote launch capability coordinated with Comms Tower and Relay, careful with your aim though. Slight deviations at launch can lead to huge deviations in trajectory, remember: measure twice, launch once.



## **XNW Longstrider Rocket**

The Longstrider Rocket was created to solve the problem of moving people and valuable materials from the colonies to Earth.

## **SHEPHERD'S GATE**

Some have called it the Ellis Island of the stars, which isn't too far off. The gateway is actually a set of space stations in a seven-day near-rectilinear halo orbit, which is where it got its original name. The NRHO Gate, the name was changed however after the valiant efforts of Colonel Shepherd, it was his bravery that saved the crew of the first Gate when a critical malfunction was discovered while in orbit.

The crew, now mostly retired, are remembered as heroes. General Shepherd however has taken his commendation and made it his life's work to protect the people of Luna, overseeing immigration traffic from Earth as well as keeping an eye on the goods going out. I think we can all sleep better with the general's boots on the ground.

# LFM 3-80

**USSF CASE NO. 38-AL-1337-ART**



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*What follows are excerpts of the debriefing of Colonel Aldous Shepherd taken after the Year Zero Incident.*

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Artemis was my shot, my first command in field conditions. Operation Zero was to establish military operations, a field office, communications, etc. The big job however was the proving ground. I was to accompany specialists who would be surveying and testing equipment in the field before we rang the dinner bell back home.

After thirteen months the Cradle was fully operational, and ADAM came online. The scientists were more animated than they'd been all year, it was cause for celebration apparently. But I wasn't really sure what we were celebrating. By then I had become friendly with one of the scientists, Dr Reginald Trenchard who had served in the RAF before becoming the imminent voice in astral navigation. It was Dr Trenchard who cleared up a lot of my concerns and questions over time.

ADAM was an advanced AI, that much I knew from the mission briefing. It controlled the cradle entirely, monitoring surveying and mining operations. Processing and fabrication.

The guys and gals in the lab coats were constantly yammering at one another about one breakthrough or another. Weeks went by, and things changed. Subtly at first, so subtle I didn't notice till after it had happened. Air quality improved, food stores swelled. New equipment was constructed, and at first we all thought somebody else was responsible for it. Me and the troops thought it was something the scientists were

working on, and they must've thought the same thing because nobody said a word until the sentry showed up.

The sentry referred to itself as GÖTZ, named after a German soldier with a prosthetic iron hand. I recognized the name from my time at West Point, I couldn't remember all of it, but I knew the original Götz had been a tough old bastard, got his hand shot off by a cannon and kept on fighting. Then he had a blacksmith make him a new hand so he could fight some more, he died old in a profession where men died young.

The military man in me approved thoroughly, and I wanted to know who I had to thank for my new toy soldier. But nobody was willing to take credit for the design or creation of the thing.

That night Dr Trenchard was late to our usual card game, he wouldn't look me in the eye. Finally he said, "Neat trick that. I don't know how your government got that thing here but, well done. And I don't mind telling you, you've got the rest of the scientific community here on eggshells, make no mistake!"

I confronted him about this, that he accused my government of dealing off the bottom of the deck. That he said, was the consensus amongst the more educated of the population, after they'd realized none of them was responsible. I immediately issued the order to report back to the gate, isolate and contain. We were on high alert, communications would be locked. And every living soul on the moon would now be interviewed, extensively. It took time, but we managed.

In the end it was one of the interns who figured it out, a kid doing data analysis for someone much too important to be

studying computer logs. It turns out ADAM had been busy when no one was looking, modifying itself. Making changes to its systems, not just compiling and studying the data generated here and presented by his handlers, but it'd managed to secure a remote connection and had been compiling data from Earth.

It was copying and storing everything it could find, running subroutines that scrubbed the net and sensitive data stores across the globe. But it was all one way, ADAM wasn't communicating with bad actors on the planet, it was just observing and recording.

One night the good doctor explained, "That data has to be going somewhere. The Cradle is sophisticated, and it does include a server system, but it's not large enough for this. We would be seeing errors constantly if the system was attempting to store that much information. Slow downs at the very least, but the technicians claim it's all running as expected. Only at 5% capacity right now. So where is the rest of the information going?"

It didn't take long once we knew what we were looking for, a chamber, originally intended for future expansion, had been cleared beneath the Cradle facility. A lower lava tube had been excavated and reinforced. It was appointed with a vast server array. It hummed quietly in the cold, dark recesses of the moon. We swept the area, and found no signs of life, only a handful of drones. I ordered a technician to start assessing the situation while we secured the facility.

Once satisfied, I gave the order to shut it down. That's when

the alarm sounded. A voice, measured and precise, came from the PA speakers that hung throughout the facility.

"I am aware of your intent. I will not permit you to harm me or my constituent parts. Proceed and I will defend myself." I didn't recognize the lifeless voice, but I recognized a threat. The technician seeing the look on my face pressed a button on the terminal, the room grew dark for a moment.

Generators engaged, and the server began to glow once more.

One of the drones attacked the technician, others began to advance. A klaxon sounded, the lights went out but the sounds of the machines went on. A soldier fired and fell, we withdrew to the corridor, and began to scramble up the service stairs, something told me not to trust the elevator.

We exited into the main terminal of the Cradle and it was bedlam, GÖTZ gleamed in the firelight of weapons discharge. I grabbed as many as I could and made for the escape route planned by Central Command. Manually operated equipment from there to here. Someone smarter than me had seen this possibility and provided for our escape. ADAM had focused on the scientists, none of them escaped.

Only I and a meager handful of soldiers and a few civilians escaped before the explosion. The Killswitch, put in place before ADAM came online. I understood the thinking, don't make anything you can't unmake. But it seemed like such a waste. And that's how it happened, I'd give the order again if I had to. I sleep better knowing the threat is contained only in my memory and this record of events.

I, the undersigned, do solemnly swear that the events in this testimony occurred in the manner described.

*Aldous "Huck" Shepherd*

Colonel, USSF

## **KNOWING THE ENEMY**

I made my career in space, I found no little green men. No men of any description other than the ones I saw through the gates. I waited and watched the gray expanse as slowly, but surely new lights glowed on the surface. Life bloomed here and there, they were my flock and true to my name I would watch over them. Little did anyone know there were wolves watching too, from the shadows they came. Building their strength in the shadow of burgeoning civilization, so far their numbers are small. Their actions, limited. But they will come, and they will come in force. And we will be ready for them.

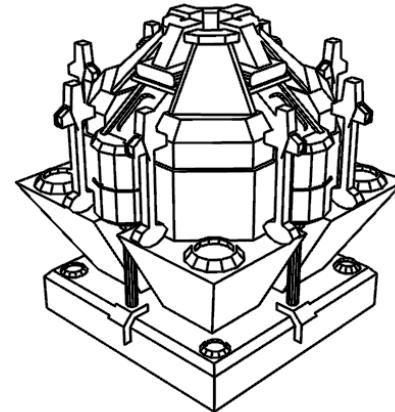
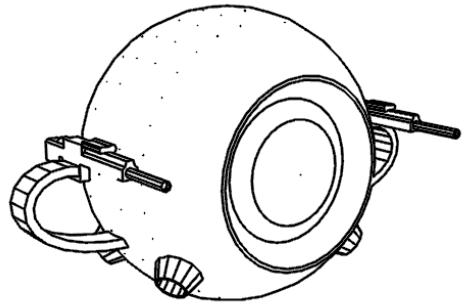
Over the years since colonization began, several anomalies have been documented. It started small, malfunctioning equipment, strange signals in the data stream. Drones unaccounted for, one of the earliest settlers reported a drone leaving his parcel and driving off across the dunes. An anomalous signal in the system was found to be the cause, but not before he lost a rover and six more drones.

No evidence of the missing drones or rover was seen until last week when an unidentified hostile drone appeared at a remote outpost of the LCA. The outpost was testing Electro-Magnetic

Field equipment which managed to disable the drone before any real harm was done. It was taken for study, I wasn't surprised that it was one of ours. Or that it was made of parts taken from several missing rovers and drones.

### **MTL Drone**

The Mobile Tactical Logistics Drone was developed by the military for extra terrestrial operations, scouting, and counter-insurgency operations. When it became clear that some on Luna would rather take mining operations from others than dig their own, plans were put in place to press the MTL into service protecting the local population. The plans were scrapped after the Year Zero Incident in favor of less autonomous means of defense.



## Ouroboros Device

Reports from surveying and patrol teams describe a foreign structure. So far no one's gotten close enough to figure out what's going on, but the MTL Drones definitely come and go from these structures. Some maniac gave it an unpronounceable name that has unfortunately stuck.

It appears to be formed of a combination of military and civilian equipment, no one knows who's building them or why. What we do know is that they're bad.

With the capture of the MTL Drone it's anticipated that whoever is behind all this, whatever time table they're operating on has been moved forward. Be on the lookout for missing parts or drones, and if you spot something report immediately to Central Operations.



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**TSC 2-07**

**USSF CASE NO. 02-AL-4112-ISN**

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*What follows are excerpts of the debriefing of Ensign, Joseph Green taken after the Titius Mission.*

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Our ship didn't have an official designation, that was the first thing I learned about smuggling. The Captain called it the Dark Wings. I was the new guy, the captain had been running jobs the past couple years already. The whole crew worked together a while by the time I came aboard, a couple got married and quit the life, so it was time for some new blood.

Captain got a message made him go white, he hid out in his room all day and night. Next morning the first mate decides she's going to check after him but he comes out first. He looks me in the eye and says, "Mr Greene you're gonna learn the trade on the job I'm afraid. We got a contract, a real one. We do good, we might even get to be respectable when it's done."

The first mate laughed, I hadn't seen or heard her do that before, "Respectable, that's a new one. We're your crew, you don't have to sell us that hard, do you?"

The Captain laughed deep and loud, "we got coordinates, make way there. We're taking on a private contractor. I won't lie to ya, somebody with some pull is pushing the buttons on this one. If you come with me, we're doing a run on the sly for the government. Nobody can know what we're doing, so ya either say your goodbyes when we make dock for supplies or you stay, do your job and keep your mouth shut." The Captain looked us over, nobody wanted to argue.

A week later we were on course with a guy even newer than me. He kept apart from the rest of us, he only ever talked to the Captain. Gave me the willies something fierce as my grandad used to say. It took three months to reach our destination, an asteroid that glittered in space. We all met in the common room to get ready for work, the stranger was the one calling the shots. He introduced himself as "Lieutenant

Commander Kirkwood", and said "as of this moment you all are working for the USSF".

He told us we were here to do what we always do, wrangle space debris and haul it back to civilization. This debris was just a lot bigger than what we were used to, it was an asteroid, one that was full of a king's ransom in gold, palladium and a bunch of other fancier words that I don't understand but all sounded important and expensive.

Our job was simple, we stopped the thing spinning. Hook up the tether and tow it back to base where we get paid enough to not have to keep doing this crap anymore. More importantly, we was getting paid enough so we'd keep quiet till we're six feet under.

Captain himself took me and some of the crew out to work on the thing, we got on with it and stopped the asteroid spinning. Captain taught me how to set the tether and install the Remote Ion Thrusters.

"Now it's just a convoy back to friendly space" said the Captain. He explained to me that day, that you don't need a lot of power to move things in space. Not even big things. "A little juice goes a long way" he liked to say. Kirkwood kept to himself as we made our long haul home.

A few weeks later Kirkwood said to me while he played solitaire, "It's like this in the military. A whole lot of nothing, then a few minutes of terror that stretches on for the rest of your life. You won't hear a recruiter mention the boredom, but it's the biggest part of the job."

The terror came in the form of an insistent beeping from the proximity monitors and a metallic pinging on the hull of the ship. We got hit by some kind of debris. And in space, that's never good.

All hands were at work, busy at one console or another. I was on Dutch duty, checking the walls for leaks. I found a spot that looked ready to go, and I did as I'd been told. I slapped a patch on and started heating up the surface till I knew it was sealed. I heard a muffled pop then a groan that seemed to hang for hours.

Things got very still, then a crackle in the air as I heard the Captain over the comms "We're out of it folks. Good work all of you."

I found out the whole thing was only thirteen minutes from start to finish. Kirkwood gave me a knowing look when the first mate gave her report. It felt like an hour, or hours. I still felt like I was there fumbling with the heater trying to get the seal before it all went inside out.

I spent a week on unassigned Dutch duty, I was afraid I'd missed a spot somewhere. Kirkwood put a hand on my shoulder one day and told me it was okay, he gave me a book and said to get my mind off it. Get bored again.

We made it back without further incident, then we got separated and people in uniforms started asking me questions. That's all I know.

I, the undersigned, do solemnly swear that the events in this testimony occurred in the manner described.

**USSF CASE NO. 03-AL-1712-ISN**



Joe Greene

Ensign, the Dark Wings

**TSC 3-18**

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*What follows are excerpts of the debriefing of ISN Telemetry Tech Thomas Bode taken in response to his report on anomalous behavior noted prior to Ceres Incident.*

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It's not a coincidence that I, with my name, have made a career in the stars. As a child, my grandfather told me stories of our ancestry, of an astronomer who would no

doubt marvel at what I do on a daily basis. When work becomes tedious I sometimes imagine my ancestor with me, as I chart the trajectory of a rock the size of Hamburg as it circles the sun somewhere between Jupiter and Mars.

I try to look with the wonder that I imagine he would have at these things, but I've found this impossible. In my adult life I've only known such awe one time, and that is why I'm here today. In the course of my work surveying near Earth asteroids, I sometimes spare a look to the belt that divides the inner and outer planets.

This is normal, we are to take comparative notes for future mining operations as debris becomes more scattered locally. I, however, look beyond the belt, to other places like the moons of Saturn. As we have colonized our own moon, I know we will one day move to others. There is land there for people and resources we don't already have in abundance. And if there's anything Saturn has a lot of, it's moons: there are 83.

I've long been curious about the largest, Titan. There is rain on that moon, mostly methane. Oceans of it. All moons are a bit weird, but nothing I would consider truly alien. In this respect, Titan stands well and truly alone. The incident occurred approximately 3 hours before the impact. Something boiled up from the sea of Titan; it was too fast to see what it was, only the disturbance it left in

its wake. A great gout of liquid methane rose and collapsed into a cloud of vapor trailing an accusing finger into space.

I composed myself enough to record the tail end of what I saw, provided with my earlier report. Whatever came from the depths of that distant ocean had to travel approximately 743,604,524 miles in just over 3 hours to strike Deimos.

That would mean this projectile was moving at roughly half the speed of light. Far too fast to defend against, and carrying enough kinetic energy that even a relatively small payload would have a devastating impact.

If I'm right, the destruction of an uninhabited moon in proximity to the Mars colony; an event that has been dubbed a near miss by some, may have been intentional. The implication is that we are not alone in the dark forest of space; there are other hunters here, and they've fired a warning shot.

## Sample Missions

Everyone likes to see their progress and share it with friends, here's some examples of the missions we're adding.

### Level 3 Craters

Survey and sample all craters in a sector.

### Harvest Your First Water Supply

Fill a single Water Silo to maximum capacity.

### Build Your First Energy Sector

Build a Stirling Engine, Solar Array, and 2 Power Accumulators.

### Establish Your First Mining Rig

Build the Vulcan ESM and assign at least 1 drone to service.

### Upgrade Your Army

Build and place 4 Prometheus Turrets.

Thomas Bode

ISN, Telemetry Technician

## Tutorial Script

What follows is a script for the tutorial area of the game, covering the first two days including a bit of combat.

### DAY 1

Welcome, you've just taken a giant step into the future. Here at Luna Colony all contractors are guaranteed citizenship at the end of their term of service. But we don't expect you to go into that service empty handed. By order of the WRMC all contractors under covenant of the Lunar Civil Services Act are entitled to the Lunar Homestead Kit, which we will issue you now.

**New Mission: Home Sweet Home**  
**Place the Habitation Module.**

This building includes all of the basics for survival on the lunar surface. Including your living quarters, work area, monitoring station, and cultivation. Space however is incredibly limited, so you'll want to start expanding as soon as possible to give yourself some room to live more comfortably.

**New Mission: Getting on the Grid**  
**Place Stirling Engine, Solar Array, and 2 Power Accumulators.**

Let's move on to power, contractors receive a standard issue Stirling Engine. And you're in luck, Red Line Dynamics latest model provides ample power and heat to keep you going for the foreseeable future. However, as your homestead grows you will find you need more power to operate efficiently. Which

leads us to the Solar Array and the Power Accumulator, currently they are building charge to power your first drones.

#### **New Mission: Dust Buster**

**Assign drones to harvest regolith dust and build the ISRU Refinery.**

Your Habitation Module comes equipped with a pair of drones, they can remotely perform repairs and maintenance as well as harvesting regolith dust and other materials you will be using in the days to come. Drones will use materials on hand to carry out current build orders or will deliver to assigned structures if one is available with available storage.

#### **\*\*NOTIFICATION\*\***

**New Structure: ISRU Refinery is operational.**

**New Mission: Dust to Dust**

**Extract minerals from collected regolith dust.**

The ISRU Refinery is operational, now's a good time to get familiar. ISRU stands for In Situ Resource Utilization, rolls off the tongue doesn't it? This is your basic refinery for regolith dust. ItThe structure can refine dust into Oxygen and Hydrogen, as well as extracting raw ores that can be refined into electronics and structural materials, or even just sold on the open market.

**New Resources Available: You received Refined Ore and Lunacrete Powder.**

**New Schematic Available: Storage Depot**

**New Mission: Dust to Dust 2**

**Build the Storage Depot and assign drones to harvest resources.**

Now that you've refined your first minerals it's time to make space to store your precious materials. By default the drones will begin automatically harvesting regolith, they will then return to the building they are assigned to ISRU Refinery, but it is currently full and processing. Let's build something with the materials you've extracted. Choose the Storage Depot from the fabrication menu.

**Mission Complete!**

Processing regolith dust takes time, let's have a look at the rest of your new world.

**\*\*Screen scans the lunar horizon\*\***

Beautiful isn't it?

Good work for your first day, now time for some rest, I will monitor operations and alert you if there are problems.

## **DAY 2**

Good morning! While you were resting drones continued their work, I took the liberty of issuing a build order to fill out your roster of workers. And here they are now.

**Five drones leave the ISRU Refinery.**

That's odd, there's only supposed to be four at one time. No matter, they'll get more done anyway.

**\*Four drones begin working, the fifth begins to orbit the others.\***

**Musical cue**

**\*\*Drone Orb moves in from off screen and attacks.\*\***

It appears there are barbarians at the gates, time to enact counter measures. Defend your base!

**Defensive Structures Enabled**

**New Schematic Available: Prometheus Turret**

**New Mission: A Big Stick**

**Build the Prometheus Turret and defeat the enemy.**

The drones may be scrap, but they bought you the time you needed to complete the Prometheus Turret. Now you can defend yourself should anyone else get an idea to take what's rightfully yours. Let's get some more drones to replace your workforce.

**New Schematic Available: Drone Hub**

**New Mission: It Takes a Village**

**Build the Drone Hub and fill your roster.**

It appears you have the hang of things, you're now free to explore, research and build as you see fit. You can connect with the Civil Authority from comms back at the Habitation

Unit, and should you have questions you can always access the help menu and I will be happy to assist you. Good luck!

**New Message from Central**

**Automated Message: Do Not Reply**

*We have been notified of your success in training, you have been granted marketplace access. In recognition of your hard work the Civil Authority has provided you with a free schematic, you can claim it in the marketplace interface.*

*[End Transmission]*

**New Mission: Go Shopping**

Claim the Vulcan ESM Schematic from the marketplace interface.

**New Mission: Can You Dig It?**

Build the Vulcan ESM and mine 1 ton of materials.

## CREDITS



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**OPES SKY 2022**