LEAVING EARTH™

OUTER PLANETS

1956-1986

JOSEPH FATULA
THE LUMENARIS GROUP, INC.™

COMPONENTS

5 maneuver planning pads
10 advancement cards
5 space agency cards
52 component cards
5 spacecraft tokens
5 spacecraft cards
38 location cards
38 mission cards
3 calendar cards
10+ time tokens
1 rulebook

INTRODUCTION

Everything is theoretically impossible, until it is done.
One could write a history of science in reverse by assembling
the solemn pronouncements of highest authority about
what could not be done and could never happen.

— ROBERT HEINLEIN, 1952

Explore the giant planets of the outer solar system all the way into 1986, visit the four great moons of Jupiter, see the rings of Saturn, search for life on mysterious Titan, and fly by the distant planets Uranus and Neptune.

Outer Planets builds on the rules of the base game, adding several new features including: scientists who can study samples without having to bring them home to Earth, slingshot maneuvers that are easy to use (but only available during certain years), exploration that changes the available missions on the table, aerobraking as a dangerous way to perform maneuvers with much less fuel, and several new types of probes.

Arrangement of the location cards.

SETUP

It is our judgment that the current funding for planetary exploration is totally inadequate.

— SPACE SCIENCE BOARD, 1969

Space Agencies

Each player chooses an *Outer Planets* space agency card, then takes that agency's five spacecraft cards and matching tokens. (The agency cards from the base game will not be needed.)

Locations

Locations in this expansion work the same as locations in the base game: some come in only a single version, while others are drawn randomly and then explored during the game.

Arrange the locations according to the diagram on page 2. This expansion comes with replacement cards for *Mars Fly-By* and *Venus Fly-By*; use those instead of the ones from the base game.

Missions

Depending on the difficulty of game you would like, only certain missions will be available. For a normal game, remove any *Outer Planets* missions worth more than 13 points and put them back in the box.*

* This point cap is for *Outer Planets* missions only, not missions from the base game.

In the base game, the backs of mission cards show their difficulty: easy, medium, or hard. In *Outer Planets*, the backs of most mission cards show where they take place, like *Jupiter* or *Titan*. These are explorable missions that will be drawn when those locations are revealed during the game. The remaining *Outer Planets* missions have no specific location on the back and are non-explorable.

Separate the mission cards from the base game into three stacks (easy, medium, and hard) then shuffle each stack. Make a stack for the non-explorable missions from *Outer Planets*, then shuffle those as well. For a normal game, draw 3 easy, 1 medium, and 4 non-explorable missions. Lay them out on the table for everyone to see, then put the rest of those stacks back in the box. For an easier or harder game, here are the sets of missions to draw instead:

	missions to draw	**Outer Planets point cap**
easy game	5 easy, 3 non-explorable	6
normal game	3 easy, 1 medium, 4 non-explorable	13
hard game	3 easy, 2 medium, 1 hard, 5 non-explorable	24
very hard game	1 easy, 2 medium, 1 hard, 6 non-explorable	n/a

There are no explorable missions worth 6 points or less, so in an easy game there will be no explorable missions on the table at all. In a very hard game there is no point cap, so all explorable missions will remain on the table.

Separate the explorable missions by location, then shuffle each stack. Set these small stacks near the location cards they correspond with. During the game as these locations are explored, one explorable mission from each stack will be drawn. (See *Missions* on page 15.)

Components

Set the components out in stacks by type. *Outer Planets* adds several new component types:

- *Explorer* payloads: a special component that is needed to complete certain missions. (See *Explorer Missions* on page 16.)
- *Galileo* probes: a heavier, radiation-resistant probe that is useful in areas of high radiation, and is required by certain missions. (See *Advanced Survey Missions* on page 16.)
- *Proton* rockets: an expensive rocket that has a very high thrust-to-mass ratio.
- Samples that can be collected from many locations.
- Scientists: a new type of astronaut that can complete Sample Return and Extraterrestrial Life missions out in space. (See *Sample Return / Extraterrestrial Life* on page 16.)

Advancements

Set out advancements as usual. *Outer Planets* adds two new advancements, each with a prerequisite:

- *Proton Rockets* lets you build the new rockets, and can only be researched once you have *Soyuz Rockets*.
- *Aerobraking* lets you survive the new aerobraking hazard, and can only be researched once you have *Re-Entry*. (See *Aerobraking* on page 9.)

Other

Set out the outcomes, time tokens, money, and die from the base game.

Calendar

During setup, decide whether you would like to play the full game (1956 to 1986), or a shorter game (1966 to 1986). If you decide to start in 1966, each player begins the game with two free advancements of their choice, with no outcomes remaining on them. Both of these advancements must have no prerequisite: *Aerobraking* and *Proton Rockets* are not available for this purpose.

MANEUVERING

The configuration of the planets in the 1970s presents a unique opportunity for studying several planets on a single mission, thus substantially reducing the cost of exploration of this part of the solar system. We believe that we must take advantage of this situation.

— SPACE SCIENCE BOARD, 1969

Slingshot Maneuvers

Most maneuvers are available all the time — from the Moon, you can always attempt to launch into Lunar Orbit. Slingshot maneuvers are only available during certain years — if you want to slingshot around Venus to get to Jupiter, you have to wait until the planets are aligned correctly.

A slingshot maneuver to Jupiter Fly-By.

A slingshot maneuver is marked with the symbol of the planet it leads to, and the text of the maneuver is written in that planet's color.

Jupiter *Saturn* *Uranus* *Neptune*

On the calendar, each year is marked to show which slingshot maneuvers are available. In 1970, for example, you may use slingshot maneuvers leading to Jupiter and Neptune, but not to Saturn and Uranus. Some years (like 1979) have no slingshots available.

Regular maneuvers allow you to go faster (for higher difficulty) or slower (to use ion thrusters better). When performing a slingshot maneuver, you must take the exact amount of time listed — no more, and no less.

Maneuver Windows

On each space agency card there is a maneuver window chart. This shows where you need to be, and when you need to be there, in order to get where you want to go.

For example, if you want to reach Saturn in 1983, you will need to fly by Jupiter in 1981, which means you need to fly by Venus in 1980, which means you need to leave Earth Orbit in 1978.

EARTH	56		58	60	62			64	66		68		70	72	74		76	78	80		82	♁
VENUS	58		60	62	64			66	68		70		72	74	76		78	80	82		84	♀
JUPITER	59	60	61	61	65		66	67	69		71	72	73	75	77	78	79	81	83	84	85	♃
SATURN		62				67	68		71	72		74		77		80		83		86		♄
URANUS		67				72		76		77				82								♅
NEPTUNE								80						86								♆

Note what happens if you leave Earth in 1972: there is a single journey leading all the way from Earth to Neptune, visiting every outer planet along the way. This represents the Grand Tour used by the Voyager probes.

There are alternate ways to reach the outer planets (flying by Mars or using the *Outer Planets Transfer* point) but this chart covers the most useful route, a slingshot around Venus.

Multiple Maneuvers

Some locations have multiple maneuvers leading to the same destination. For example, *Outer Planets Transfer* has two maneuvers leading to *Earth*: each with different hazards and difficulty.

MANEUVER HAZARDS

Always face maneuver hazards in the order their symbols are written in. For example, going from *Jupiter Orbit* to *Io*, you face Jupiter's hazard immediately, then you may add time tokens, then on arrival you face landing and whatever hazard Io presents.

Aerobraking

aero-braking hazard

When approaching a planet at high speed, sometimes you can skim through the upper atmosphere to slow down. This is known as aerobraking. Without the *Aerobraking* advancement, any spacecraft facing the aerobraking hazard is destroyed, burning up in the atmosphere. With *Aerobraking*, however, your spacecraft has a chance of surviving.

- On a *Success*, the spacecraft takes no damage.
- On a *Minor Failure*, one component is damaged (you choose which one), then the spacecraft faces the atmospheric entry hazard ☁.
- On a *Major Failure*, the spacecraft is destroyed.

Radiation

Among the outer planets, radiation is a common hazard. There are three different ways radiation can affect a spacecraft:

ROLL DIE PER ASTRONAUT
2x⧖ OR LESS: SICK

ROLL DIE PER ASTRONAUT
1–2: SICK

ROLL DIE PER PROBE/CAPSULE
1–2: DAMAGED

The first type is found only on *Solar Radiation* in the base game. It only affects astronauts, and its danger depends on the number of years of your maneuver.

The other two types are found in *Outer Planets*. One causes astronauts to become sick, while the other damages probes and capsules. Neither of them depend on the number of years of your maneuver.

When radiation strikes your spacecraft, roll for each astronaut/probe/capsule affected before taking any other actions. (This means that a doctor can only heal incapacitated astronauts after all astronauts have rolled for radiation.)

Radiation Shielding

Two components are partially shielded against radiation: the *Aldrin* capule and the *Galileo* probe. These reduce the level of radiation by one for themselves and for their occupants. They do not protect any other components.

As an example, consider a spacecraft made of a *Galileo* probe, a regular probe, an *Aldrin* capsule, and an astronaut. If this spacecraft faces the following radiation:

a die roll will be needed for three different components: the *Galileo* probe, the regular probe, and the *Aldrin* capsule. As the regular probe is not shielded in any way, a roll of 1, 2, 3, or 4 will damage it. The *Galileo* probe reduces radiation by one, so only a roll of 1, 2, or 3 will damage it.

LOCATIONS

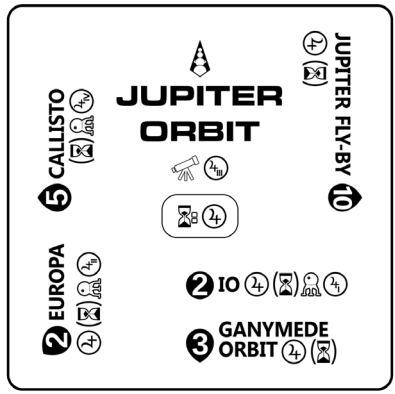
I therefore concluded that there are three stars in the heavens moving about Jupiter, as Venus and Mercury about the Sun; which at length was established as clear as daylight by numerous other observations.

— GALILEO, 1610

Surveying

In the base game, *Surveying* allows a working probe/capsule to explore nearby hazards; specifically, any hazard that is on a maneuver from the location the probe/capsule is in. For example, a probe in *Jupiter Orbit* can survey the hazards of Jupiter, Io, Europa, and Callisto.

In *Outer Planets*, certain locations allow a working probe/capsule to survey hazards that cannot be reached in a single maneuver. These are shown with a telescope symbol. For example, from *Jupiter Orbit*, a probe can survey Ganymede, even though there is no maneuver from there with the Ganymede hazard.



Jupiter Orbit

Once per Turn

Each probe/capsule can only use *Surveying* once per **turn**. This is important when performing a fly-by, where there will be an automatic maneuver at the end of the turn.

End-Of-Year Hazards

In the base game, hazards only affect your spacecraft when performing a maneuver. In this expansion, certain locations have hazards that affect your spacecraft at the end of the year. These affect any spacecraft sitting on that location, **even ones with time tokens on them**.

End-of-year hazards are shown on the location card with a time symbol, like this:  . The order of events for the year is as follows:

1. Complete start-of-year missions, like *Space Station*.
2. Everyone's money resets to $25.
3. Players take their turns.
4. On Earth, damaged components are repaired for free.
5. Check to see if astronauts in space survive.
6. Remove a time token from each spacecraft that has one.
7. **End-of-year hazards occur.**

Exploration

Here are all the types of effects that can be found during exploration:

No symbol: no particular effects.


Spacecraft is destroyed.

Samples from here may be turned in on *Earth* for money at the start of a year.


Supplies may be collected here.

Astronauts have a chance of becoming sick.

Astronauts have a chance of becoming sick from radiation, depending on the number of years of the maneuver.

Astronauts have a chance of becoming sick from radiation.

Probes and capsules have a chance of becoming damaged from radiation.


Samples from here may be used to complete *Extraterrestrial Life*.


Samples from here may be turned in on *Earth* at the start of a year for an advancement with no outcome cards, or to remove all outcomes from one of your advancements.


Debris has a chance of damaging a component of your choice.


Geysers on Enceladus allow you to collect an Enceladus sample in *Saturn Orbit*.

MISSIONS

Perhaps the greatest step in our recorded history is happening right now; we are witnessing how man reaches out beyond his native planet to set foot on his neighbors in space: the moon, Mars, perhaps Venus and the moons of Jupiter.

— ERNST STUHLINGER, 1969

Explorable Missions

As you explore the outer planets, new missions enter the game based on what you find. When an *Outer Planets* location is revealed for the first time, check to see which Greek letter is on it (if any). If there are any explorable missions for that location with that letter on the back, shuffle only those missions and draw one. That mission is now available to be completed.

The action used to reveal the location may also complete the mission that is drawn. For example, if you use a *Galileo* probe to survey Io, revealing it to everyone, you might draw the *Advanced Io Survey* mission. This mission requires you to survey Io with a *Galileo* probe, which you have just done, so the mission is therefore complete.

Multiple Survey Missions

Some locations require you to reveal multiple locations. *Grand Tour*, for example, says to "Reveal Jupiter, Saturn, Uranus, and Neptune". Such missions are completed when the final location is revealed. If Jupiter, Uranus, and Neptune have already been revealed, *Grand Tour* will be completed by the player who reveals Saturn, completing the set.

Advanced Survey Missions

Advanced Survey missions are completed by the space agency that first uses a working *Galileo* probe to survey a location, even if that location was already revealed by other means. *Galileo* probes represent spacecraft with advanced instruments on board to conduct detailed studies.

Explorer Missions

To complete an Explorer mission, you must have a spacecraft at the location that consists of a working *Explorer* payload and nothing else, then discard the spacecraft. (This payload represents a single-use vehicle for exploring unusual environments.) If there is anything else on board, you must separate the *Explorer* payload first before discarding it.

Sample Return / Extraterrestrial Life

In the base game, Sample Return and Extraterrestrial Life missions are completed by bringing the relevant sample home to be studied by scientists. In this expansion, you may bring the scientists with you.

Any mission that requires you to bring a sample to *Earth* may be completed by having the sample on board the same spacecraft as a scientist astronaut  , or you could bring it back to *Earth* instead.

Removing a Mission

In order to remove a mission from play, you must be able to prove that it cannot be completed. For example, if all spacecraft landing on the *Moon* are destroyed by conditions there, missions like *Man on the Moon* cannot be completed, and are therefore removed from the game.

Extraterrestrial Life requires you to bring home a sample of life (or bring it to a scientist). Depending on the particular location cards drawn, it is possible that no location in the solar system has life, making *Extraterrestrial Life* impossible to complete. In order to prove this, you must show that no life exists in the game, without resorting to prior knowledge of the location deck.

For example, if you look through the deck you can see that there are no versions of the *Mercury* card that have life. However, players are not required to know this. In order to finish proving that no life exists in the solar system, you will need to reveal *Mercury* to everyone.

LEAVING EARTH: OUTER PLANETS
is an expansion extending the game *Leaving Earth™* to the giant planets of the outer Solar System. The design and artwork are by Joseph Fatula. The typeface used for the body text is *Century Oldstyle*, designed by Morris Fuller Benton in 1909. The headings use *Microgramma*, designed by Aldo Novarese and Alessandro Butti in 1952. Maps of the gravitational field of Europa yield significant anomalies. *Leaving Earth™* and its expansions are published by the Lumenaris Group, Inc.™ and are available at game retailers and online at lumenaris.com. This document is rulebook v1h.

SETUP MISSIONS

GAME DIFFICULTY	EASY	MED	HARD	NON-EXPLORABLE	POINT CAP FOR OUTER PLANETS
EASY	5			3	6
NORMAL	3	1		4	13
HARD	3	2	1	5	24
VERY HARD	1	2	1	6	n/a

NEW CONCEPTS

During setup, take out all Outer Planets missions with point values above the cap, then shuffle the rest by location. Draw some random non-explorable Outer Planets missions.

When an explorable location is first revealed, draw a random mission with a matching symbol, then put the rest away.

Slingshot maneuvers can only be performed during certain years. They cannot be done faster or slower.

Sample Return and Extraterrestrial Life missions can be completed by getting the sample to a scientist.

Each probe/capsule can only use Surveying once per **turn**.

End-of-year hazards affect any spacecraft in that location, even if the spacecraft has time tokens.

EACH YEAR

Complete start-of-year missions.
Money resets to $25.
Lowest score goes first.
Player turns till everyone is done.
Free repairs on Earth.
Astronauts need health, life support, and supplies.
Remove a time token.
Face end-of-year hazards.