

FIREDRAKE @ BOARDGAMEGEEK

LEAVING EARTH, OUTER PLANETS, STATIONS: THE RULES

The rocket worked perfectly, except for landing on the wrong planet.
— Werner von Braun, September 1944

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Introduction

This is intended to be a comprehensive rulebook for Leaving Earth with both Outer Planets and Stations expansions in play. (Also Mercury, but there are very few copies of Leaving Earth without it.) Rules which do not apply to this fully-combined game have been omitted.

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Setup

Map

Neptune	Neptune FB	Uranus FB	Uranus		Saturn
Jupiter	Europa	Callisto		Saturn O	Enceladus
Io	Ganymede O	Jupiter O	Saturn FB	Titan O	Titan
	Ganymede	Jupiter FB	Outer Planets Transfer		
	Phobos	Mars FB	Ceres	Venus O	Venus
	Mars	Mars O	Inner Planets Transfer	Venus FB	
			Earth O	Lunar O	Moon
Mercury FB	Mercury O		Suborbital Space	Lunar FB	
	Mercury		Earth		Solar Radiation

Lay out the location cards, unexplored side up. For any location that has multiple cards, shuffle all the cards for that location, choose one and place it; do not look at it or at the other cards for that location, which are returned to the box and will not be used in this game.

Shuffle and set out each Feature deck near the corresponding location.

Components

Lay out component cards and advancement cards in piles in a way that's accessible to all players.

Money

Use the original game's paper money, or the cards from *Stations*, or coins, or a pegboard, or whatever works for you. In this document the α symbol is used for currency.

Agencies

Each player takes a national space agency card along with its five spacecraft cards and tokens.

Mission Selection

Place *Extraterrestrial Life Sample* on the table, with *Extraterrestrial Life Survey* on top of it. Survey is available at the start of the game; once it is completed, Sample becomes available.

Choose one *Occupation* mission at random.

Return to the box all Outer Planets missions (both explorable and non-explorable) with a point value higher than the OP points cap.

Randomly draw and reveal other missions from the *Stations* and *Outer Planets* mission decks (the original game's mission cards will not be used), according to your preferred difficulty level:

	Easy	Medium	Hard	Non-Explorable	OP points
Easy Game	6			3	6
Normal Game	6	3		4	13
Hard Game	4	5	3	5	24
Very Hard Game	1	6	6	6	∞

If you draw a second copy of the same mission, add point tokens equal to its mission value divided by 10, rounded up to the next $\frac{1}{2}$ point.

All remaining Explorable missions (with a location on the back of the card) that do not exceed the OP points are unavailable at the start of the game.

In the solo game, discard and redraw duplicate missions.

Outcomes

Shuffle the main outcome cards deck and the smaller Stations outcome cards separately. Use the main outcome cards deck first, and the Stations cards if needed; do not mix them on a single advancement.

Calendar

Choose short or full game.

Full game: Set the calendar to 1956.

Short game: set the calendar to 1966. Each player gets two advancements, with no outcome cards on them; these advancements may not depend on any others, so *Aerobraking*, *Proton Rockets*, *Rover*, *Synthesis* and *Space Shuttle* are not available.

The Turn Sequence

The Year

- Production: a hydroponics module with a healthy astronaut draws a Synthesis outcome to produce one food. One healthy astronaut can operate any number of hydroponics modules in their location.
- Production: a fuel generator in a CO₂ location draws a Synthesis outcome to produce one small fuel tank.
- Production: a healthy mechanic on the ground with Habitat Parts may convert them into a Habitat.
- Occupation: each Agency with one or more astronauts in a location named on an active Occupation Mission card gets ½ a point.
- National agencies' money is reset to 30.
- Any missions resolved "at start of year" are checked now.
- Any valuable samples on Earth may be sold for the listed value each.
- Players take turns, lowest score first (not counting penalties for astronaut deaths); see *The Player Turn* below. Repeat this sequence until nobody wants another turn; often players take just one turn each, but they may wish to react to other players' actions.
- All damaged components on Earth are automatically repaired.
- All incapacitated astronauts on Earth are healed.
- All incapacitated astronauts off Earth die.
- Check life support for any capsule off Earth (+1 outcome level if a [wrench] astronaut is present; if not enough working life support is available in a given spaceship, excess astronauts die.
- Check food: discarding one unit of Food feeds up to five astronauts in that location. Unfed astronauts die.

- Check mental health for any astronaut who is the sole occupant of a spacecraft, or in a spacecraft with more than half its seats occupied. A d8 roll of 1 leaves them incapacitated.
- For each spacecraft with at least one [hourglass] token, remove one token. A spacecraft with no [hourglass] left has arrived in its new location.
- Check end-of-year hazards (hazard shown as [hourglass]: before the hazard symbol) for any spacecraft in a location that has them.
- Advance the calendar to the next year.

The Player Turn

Actions may be taken in any order, as many as resources allow.

At the end of a player's turn, any of their spacecraft in a location with an automatic (!) manoeuvre make that manoeuvre.

Completing a mission is not a separate action; it happens automatically when the conditions are fulfilled. If a mission is proved to be impossible (e.g. landing on Venus when probes have shown that any spacecraft there will be destroyed), it is removed from the table, and this decreases the total points required for a victory.

If you complete a mission with a duplicate available, take the one with the higher point value. You may not claim more than one copy of a mission.

When a national agency completes a mission, every other national agency immediately receives \square_{10} .

Research an advancement

Spend the cost of an advancement (usually \square_{10}) to take a copy of that advancement card. Place on it the relevant number of randomly-chosen Outcome cards (normally 3). *Proton* requires that you first have *Soyuz*; *Aerobraking* similarly depends on *Re-Entry*; *Rover* depends on *Surveying*; *Synthesis* depends on *Life Support*; *Space Shuttle* depends on both *Re-Entry* and *Atlas*. Having the advancement only gets you the ability to build the technology, not any examples of the components the technology lets you build; buy those separately.

Whenever you "test" an advancement, i.e. do something that requires it to work, if it has no Outcome cards, it's automatically a success. Otherwise, shuffle its Outcome cards and draw one, then implement the corresponding result listed on the advancement card. You may if you wish then pay \square_5 to remove any Failure, or \square_{10} to remove a Success – though if a Success was the last outcome card, it

is removed automatically without charge. If you don't pay, return the Outcome card to the advancement.

Buy a component

Check that you have any required Advancements, then pay the cost of the component and add it to your stock. (Samples cannot be bought, only obtained by exploration.) The physical stock of components is not intended to be a limit on availability.

Assemble a spacecraft

Combine one or more components onto a spacecraft card, and put the corresponding token on Earth.

Disassemble a spacecraft

Return the token of a spacecraft on Earth to its card, and return its components to your stock.

Abandon a spacecraft

Return the token of a spacecraft in space to its card, and return the components to the common supply. (The number of spacecraft cards is not intended to be a limitation on concurrent missions, but this helps to keep the board tidy.)

Perform a manoeuvre

Use one or more rockets to move a spacecraft from its present location through a manoeuvre listed on that location. The required thrust is the total vehicle mass (including all rockets that will be fired) multiplied by the difficulty rating of the manoeuvre. A 0-difficulty manoeuvre does not require any rockets.

If the manoeuvre has one or more [hourglass] on it, it will take that many years (place that many time tokens on the spacecraft). You may modify this: double the difficulty to halve (rounded up) the time, as often as you like, or take as much extra time as you like but without reducing difficulty. A ([hourglass]) indicates that the manoeuvre does not take time by default, but *may* have time added to it.

A normal rocket (Juno, Atlas, Soyuz, Proton, Saturn) is consumed in the process of being fired.

An ion thruster may only be used on [hourglass] manoeuvres, including ([hourglass]), and produces its listed thrust per [hourglass] without being consumed.

Thus the available payload for a rocket of thrust T , mass M , in manoeuvre difficulty D , is $\frac{T}{D} - M$. This is what is listed on the reference cards and in the appendices.

But test it only once, at the start of the manoeuvre.

A Space Shuttle consumes one Large Fuel Tank to produce its listed thrust; it may not use multiple tanks in the same manoeuvre.

A Daedalus consumes one Small Fuel Tank to produce its listed thrust; it may not use multiple tanks in the same manoeuvre.

You may freely combine multiple rockets and types of rocket in a single manoeuvre.

Fire (and test, if needed) one rocket at a time; if you have more than one of a particular type of rocket, you must fire them separately. You may choose to abandon the manoeuvre at any point. If you do not develop sufficient thrust for the manoeuvre, the spacecraft stays where it is.

If the manoeuvre shows hazards, they must be faced. A hazard in parentheses *may* be faced at the controlling player's option (for example, any spacecraft returning to Earth *may* face the Landing hazard, allowing testing of Landing).

If the manoeuvre has a planet symbol attached to it, it is a Slingshot; it is only available in a year that lists that symbol on the calendar. Slingshots may only be performed as written, without adding or removing [hourglass].

If the manoeuvre reveals a new location, the player has a choice between making the information public and keeping it private but destroying the spacecraft.

If the newly-revealed location has a Greek letter on it, shuffle all the explorable missions for that location with that letter and turn one face-up.

If you move a spacecraft into a location that is already revealed and has room for at least one more feature, you may choose to explore a new feature there: draw one feature card from that deck and place it face-up. If you have a [ship's wheel] astronaut, you may draw 2 and choose 1, replacing the other at the bottom of the deck.

Dock two spacecraft or separate one

If joining two spacecraft, they must both be in the same location and have no time tokens on them. Test Rendezvous to see if the attempt is successful. More complex evolutions (e.g. transferring a component from one spacecraft to another) are broken down into individual Rendezvous actions (e.g. separate the component from spacecraft A to create a new independent spacecraft, then join it to spacecraft B).

This process may involve putting out a new spacecraft token and card, or removing one from the board.

To perform "Full Rendezvous Testing" with a spacecraft that can separate and dock repeatedly: reveal outcomes one at a time, and do not immediately replace them in the pack even if you don't pay

to remove them. If you get a failure, you may pay ⌘5 to remove it, and testing stops there. On a success, you may pay ⌘10 to remove it (if the last card is a success it's removed free of charge). When you stop testing, if any cards have not been removed, replace them on the Rendezvous advancement. Note that an advancement with two known Success outcomes is not the same thing as an advancement with no outcomes left.

Survey unexplored conditions

A working probe or capsule may survey a location near its own: either one which has a manoeuvre leading to it, or one listed with the telescope symbol on the current location tile (e.g. Jupiter as seen from Jupiter Orbit). Test Surveying; if successful, look at the underside of the tile, and reveal it if you like. Each individual probe or capsule may Survey only once per turn.

Collect a sample from an extraterrestrial body

A working Probe or Capsule (with or without astronauts on board) can collect any number of Samples.

Repair a damaged component

An astronaut with the [wrench] symbol may spend one Spare Parts to repair all damaged components on their spacecraft.

Heal an incapacitated astronaut

An astronaut with the [cross] symbol may spend one Medical Supplies to heal all incapacitated astronauts on their spacecraft (but not if they are themselves incapacitated). If they have access to a Medical Module, they need not spend any Medical Supplies.

Build a ground habitat

An astronaut with the [wrench] symbol may flip "Habitat Parts" on a body to a Habitat. It may not then be moved.

Form a Joint Venture, buy or sell shares

See *Joint Ventures* below.

End turn

Any spacecraft in a location with an automatic (!) manoeuvre follows that manoeuvre.

Other Matters

Astronaut deaths

The first astronaut death for an agency is worth -2 points to their score; the second -4; the third -6; etc.

Completing missions

The moment you complete a mission, take its card (and any point tokens on it) to your score area. If you were acting as a national space agency, every other national space agency gains ± 10 . You may not claim a second instance of the mission even if you achieve it again.

Joint Ventures can only take the first instance claimed of a duplicate mission; nobody's interested in second-comers without national prestige.

If a mission proves to be impossible, such as "man on Venus" when landing on Venus cannot be done, remove it from the display.

Sample Return and Extraterrestrial Life missions may be completed by returning the sample to a Science module with a healthy Scientist, or to Earth.

The Experiment mission requires a Science module, a healthy Scientist, and an Experiment payload to conduct the Experiment; the payload must then be returned to Earth to complete the mission..

Man to [location] and back missions may be completed by bringing the astronaut to a habitat module.

Occupation missions are not completed, but award $\frac{1}{2}$ point each year to each agency with an astronaut in that location.

Damage to spacecraft

When a spacecraft is damaged, choose one of its undamaged components (with a "damaged" reverse side) and turn it over. If there are no such components left, the spacecraft is destroyed. A damaged component may not perform its functions (support astronauts, collect samples, provide thrust, etc.).

Hazards

Aerobraking destroys the spacecraft if its owner does not have the Aerobraking advancement. Otherwise test Aerobraking.

There are four types of *Radiation* hazard: to astronauts, or to probes/capsules; and for simply being in the place at all, or based on the number of [hourglass] tokens on a manoeuvre. If there is neither an astronaut symbol nor a lightning bolt in a radiation hazard, assume an astronaut symbol. The Galileo probe reduces the level of radiation by 1 for itself; the Aldrin capsule reduces it by 1 for itself and its occupants; Space Habitats ignore all radiation.

Re-Entry is *only* faced by components that have a relevant outcome (crew capsules).

Joint Ventures

Spend \square_{10} to set out the agency card for a Joint Venture. You and at least one other agency divide up the ten shares (you may ask for money for this).

Any national agency with shares in at least one Joint Venture, and any Joint Venture itself, is a Trading Agency, able to exchange components, technologies, etc. with any other Trading Agency. A national agency without such a share is a Non-Trading Agency and may only exchange money for a share in a Joint Venture.

A Joint Venture has its own stock of money, components, spacecraft, completed missions and point tokens. It does not have its own advancements and cannot own shares in Joint Ventures

On your turn, if you own a share in a Joint Venture, you may use its assets as if they were your own, as long as *all* other shareholders agree. If you use an Advancement you do not have, if it's a rocket you gain a copy of that advancement with a full complement of outcome cards, which you then test normally. If it's anything else the result is a Major Failure.

If a Joint Venture has earned points, its shares may be sold to the bank: \square_1 per point it has earned so far, rounded down to an integer cost per share. Shares may be purchased from the bank by any player, at the same price. This also applies if its score is negative; round towards zero. If the share value is zero, the bank will neither buy nor sell shares.

If one national agency ever owns all shares of a Joint Venture, the Joint Venture is dissolved and its assets are transferred to that agency. If the bank owns all shares, the Joint Venture is dissolved and its assets are returned to stock.

At the end of the game, points earned by a Joint Venture are di-

vided evenly among its shareholders, without rounding. Points gained by the bank are ignored.

Rovers

A spacecraft consisting only of a Rover may explore new Features of a body where it is present without needing to manoeuvre away and back again. Draw two outcome cards when using the Rover

Victory

In the multiplayer game, you win by having a majority of the attainable mission points, or by having most points when the calendar runs out.

In the solo game, you win if you have at least 50% of the points value of all face-up missions (Occupation is regarded as zero point value for this purpose), and you have completed all non-explorable missions.

Components

Juno, Atlas, Soyuz, Proton, Saturn: single-use rockets.

Ion Thruster: reusable rocket. Only for manoeuvres with [hour-glass].

Daedalus: reusable rocket. Needs a Small Fuel Tank to fire.

Shuttle: combination capsule (re-entry capable) and reusable rocket. Needs a Large Fuel Tank to fire.

Eagle: capsule that can't re-enter.

Vostok, Apollo: capsule that can re-enter.

Aldrin: capsule that can't re-enter but offers some radiation protection.

Probe: basic sensor platform.

Galileo: advanced Probe.

Rover: specialised Probe for exploring planetary surfaces.

Explorer: specialised Probe for exploring outer planets.

Ground Habitat, Space Habitat: long-term radiation-proof habitation for astronauts..

Medical Module, Science Module, Hydroponics Module, Fuel Generator: utility payloads for specific purposes.

Food, Spare Parts, Medical Supplies: mission consumables.

Experiment: a packaged experiment to be performed in a location.

Sample: materials collected from off Earth.

Tables

Expendable and tanked rockets

diff/rocket	Juno	Atlas	Soyuz	Proton	Saturn	Shuttle	Daedalus
1	3	23	71	64	180	65	19
2	1	9 1/2	31	29	80	27 1/2	8
3	1/3	5	17 2/3	17 1/3	46 2/3	15	4 1/3
4		2 3/4	11	11 1/2	30	8 3/4	2 1/2
5		1 2/5	7	8	20	5	1 2/5
6		1/2	4 1/3	5 2/3	13 1/3	2 1/2	2/3
7			2 3/7	4	8 4/7	5/7	1/7
8			1	2 3/4	5		
9				1 7/9	2 2/9		
10				1			
11				4/11			

This table gives the usable payload, *after* accounting for rocket and fuel tank mass, which each rocket can push through a manoeuvre of a specified difficulty.

Ion thrusters

diff/time	1	2	3	4	5	6	7	8	9
1	4	9	14	19	24	29	34	39	44
2	1 1/2	4	6 1/2	9	11 1/2	14	16 1/2	19	21 1/2
3	2/3	2 1/3	4	5 2/3	7 1/3	9	10 2/3	12 1/3	14
4	1/4	1 1/2	2 3/4	4	5 1/4	6 1/2	7 3/4	9	10 1/4
5		1	2	3	4	5	6	7	8
6		2/3	1 1/2	2 1/3	3 1/6	4	4 5/6	5 2/3	6 1/2
7		3/7	1 1/7	1 6/7	2 4/7	3 2/7	4	4 5/7	5 3/7
8		1/4	7/8	1 1/2	2 1/8	2 3/4	3 3/8	4	4 5/8
9		1/9	2/3	1 2/9	1 7/9	2 1/3	2 8/9	3 4/9	4
10			1/2	1	1 1/2	2	2 1/2	3	3 1/2
11			4/11	9/11	1 3/11	1 8/11	2 2/11	2 7/11	3 1/11

Purchasable items

Item	Cost	Mass	notes
Astronaut	5	0	
Food	1	1	
Medical supplies	1	1	
Spare parts	1	1	
Sample	0	1	
Probe	2	1	
Galileo	5	2	
Explorer	3	1	
Rover	4	1	
Vostok Capsule	2	2	crew1 reentry-check
Eagle Capsule	4	1	crew2 reentry-burnup
Apollo Capsule	4	3	crew3 reentry-check
Aldrin Capsule	4	3	crew8 reentry-burnup rad-1
Shuttle	10	4	crew6 reentry-check thrust75/largefuel
Large Fuel	6	6	
Ion Thruster	10	1	thrust5/time
Juno Rocket	1	1	thrust4d
Atlas Rocket	5	4	thrust27d
Soyuz Rocket	8	9	thrust8od
Proton Rocket	12	6	thrust7od
Saturn Rocket	15	20	thrust2ood
Daedalus Rocket	10	1	thrust22/smallfuel
Small Fuel	3	2	
Medical Module	5	3	
Science Module	5	2	
Hydroponics Module	10	4	
Fuel Generator	8	1	
Space Habitat	20	9	crew20 rad-∞
Ground Habitat Parts	15	5	crew20 rad-∞
Experiment	2	1	

Slingshot windows

	Jupiter	Saturn	Uranus	Neptune
1956	✓			
1957		✓ → 1962	✓	
1958	✓ → 1960			✓
1959				
1960	✓	✓		
1961				
1962	✓		✓	
1963		✓		
1964	✓ → 1966			✓
1965				
1966	✓	✓		
1967			✓	
1968	✓			
1969		✓		
1970	✓ → 1972			✓
1971				
1972	✓	✓ → 1977	✓	
1973				
1974	✓			
1975		✓		
1976	✓ → 1978			✓
1977			✓ → 1982	
1978	✓	✓		
1979				
1980	✓			
1981		✓		
1982	✓ → 1984		✓	✓
1983				
1984	✓	✓		
1985				
1986	✓			

✓ indicates that slingshots to that planet are available; ✓ → indicates that taking a slingshot to that planet will arrive in a year with a slingshot window to the next planet out.