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LEAVING EARTH: THE BOOK OF MISSIONS

It's an interesting place to be. I recommend it.
— Neil Armstrong

Contents

Introduction

I love Leaving Earth. It's a game of mission planning and risk management on one of my favourite themes.

But the mission planning can be pretty hard work, and some people don't enjoy it, even if they do want to do the risk management part of the game. If you're one of them, this document is for you! It consists of a series of mission plans, reasonably effective ones if not necessarily the best possible, for achieving the various goals that may be in play during the game.

On the other hand, if you want to learn to play by trial and error, you may want to avoid reading these plans.

Note that some of these plans require two launches. You may decide to launch both parts together and leave the second part in Earth orbit.

Missions tend to start on Earth, so here are some handy payload capacities for getting things into Earth Orbit. You can multiply these up for larger launches. Double rocket listings indicate a two-stage launch, to Sub-Orbital Flight and then to Earth Orbit.

Rockets	Payload	Cost	Cost/mass
Atlas, Atlas	1	$10	$10
Soyuz	1	$8	$8
Saturn	5	$15	$3
Soyuz, Soyuz	7	$16	$2.29
Saturn, Saturn	20	$30	$1.50

Note that all the mission plans assume you've already got the required materials into Earth Orbit.

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Around Earth

Sounding Rocket

You can do this most cheaply with three Junos, but putting the probe on any other rocket will also work.

Assemble the rockets and a probe

Maneuver spacecraft to Suborbital Flight

Artificial Satellite

This also satisfies Sounding Rocket.

This just needs you to get the probe into orbit. See above for rocket options for getting things into orbit; total payload is 1.

Assemble the rockets and a probe

Maneuver spacecraft to Earth Orbit (possibly via Sub-Orbital Flight)

Man in Space

This also satisfies Sounding Rocket.

Two options here: either use a Vostok capsule (with six Juno or one Atlas), or an Eagle (with three Juno or one of any other rocket). You'll need Re-Entry to buy a Vostok, or Landing to buy an Eagle, or you can buy them from another player who already has those advances.

Assemble the rockets and capsule

Maneuver spacecraft to Sub-Orbital Flight; reveal Sub-Orbital Flight location

Maneuver spacecraft to Earth (0)

Man in Orbit

This also satisfies Sounding Rocket and Man in Space.

Total payload to Earth Orbit is 2, so rocket options are four Atlas, two Soyuz, or one Saturn. Requires the Re-Entry advancement.

Assemble the rockets and a Vostok capsule

Maneuver spacecraft to Earth Orbit (possibly via Sub-Orbital Flight); reveal Sub-Orbital Flight location

Maneuver spacecraft to Earth (0)

Space Station

This also satisfies Sounding Rocket, Man in Space and Man in Orbit.

Requires the Re-Entry and Life Support advancements. Total payload to Earth Orbit is 3. Sending up a Mechanic will allow him to survive a minor failure of life support.

Assemble the rockets, a Vostok capsule and an astronaut.

Maneuver spacecraft to Earth Orbit (possibly via Sub-Orbital Flight); if the astronaut is incapacitated, scrub the mission and return to Earth

End year check Life Support outcome and consume one Supplies

The Moon

Lunar Survey

Requires the Surveying advancement. Payload to Earth Orbit is 2.

Assemble Juno and Probe on a stack for Earth Orbit

Maneuver spacecraft to Earth Orbit (possibly via Sub-Orbital Flight)

Maneuver spacecraft to Lunar Fly-By (1), discarding the Juno

Survey Moon from Lunar Fly-By

Lunar Lander

This also satisfies Lunar Survey.

Requires the Landing advancement. Payload to Earth Orbit is 6.

Assemble Atlas, Juno and Probe on a stack for Earth Orbit

Maneuver spacecraft to Earth Orbit (possibly via Sub-Orbital Flight)

Maneuver spacecraft to Lunar Orbit (3), discarding the Atlas

Maneuver spacecraft to Moon (2), discarding the Juno

Lunar Sample Return

This also satisfies Lunar Survey and Lunar Lander.

Requires the Rendezvous and Landing advancements. Payload to Earth Orbit is 15.

Assemble two Atlas, six Juno and Probe on a stack for Earth Orbit

Maneuver spacecraft to Earth Orbit (possibly via Sub-Orbital Flight)

Maneuver spacecraft to Lunar Orbit (3), discarding two Atlas

Rendezvous separate return stage (three Juno) from spacecraft (probe, three Juno)

Maneuver spacecraft to Moon (2), discarding two Juno

Collect a lunar sample

Rendezvous detach and abandon the probe

Maneuver spacecraft to Lunar Orbit (2), discarding the Juno

Rendezvous spacecraft with return stage

Maneuver spacecraft to Earth Orbit (3), discarding the three Junos

Maneuver spacecraft to Earth (0)

Man on the Moon and Back

This also satisfies Lunar Survey and Lunar Lander.

With Life Support, a variant of this mission can also satisfy Lunar Station; add one Supplies and one extra Juno for the lunar landing, bringing payload to Earth Orbit to 19. The two Atlas can still push this to Lunar Orbit.

Requires the Rendezvous, Landing and Re-Entry advancements. Takes one astronaut. Payload to Earth Orbit is 17.

Assemble two Atlas, six Juno, Vostok and Eagle on a stack for Earth Orbit

Maneuver spacecraft to Earth Orbit (possibly via Sub-Orbital Flight)

Rendezvous separate Vostok from spacecraft

Maneuver spacecraft to Lunar Orbit (3), discarding two Atlas

Rendezvous separate return stage (three Juno) from spacecraft (Eagle, three Juno)

Maneuver spacecraft to Moon (2), discarding two Juno

Maneuver spacecraft to Lunar Orbit (2), discarding the Juno

Rendezvous spacecraft with return stage

Maneuver spacecraft to Earth Orbit (3), discarding the three Juno

Rendezvous spacecraft with Vostok (astronauts transfer there)

Rendezvous separate and abandon Eagle

Maneuver spacecraft to Earth (0)

Lunar Station

This also satisfies Lunar Survey and Lunar Lander.

Requires the Life Support and Landing advancements. Takes one astronaut. Payload to Earth Orbit is 13.

Assemble Atlas, three Juno, Eagle, Supplies on a stack for Earth Orbit

Maneuver spacecraft to Earth Orbit (possibly via Sub-Orbital Flight)

Maneuver spacecraft to Lunar Orbit (3), discarding one Atlas

Maneuver spacecraft to Moon (2), discarding two Juno

End year check Life Support outcome and consume one Supplies

Mars and Phobos

Mars Survey

Requires the Surveying advancement. Payload to Earth Orbit is 4.

Assemble three Juno and Probe on a stack for Earth Orbit

Maneuver spacecraft to Earth Orbit (possibly via Sub-Orbital Flight)

Maneuver spacecraft to Mars Fly-By (3, 3 time), discarding the three Juno

Survey Mars from Mars Fly-By

Mars Lander

This also satisfies Mars Survey.

Requires the Landing advancement. Payload to Earth Orbit is 5.

Assemble Atlas and Probe on a stack for Earth Orbit

Maneuver spacecraft to Earth Orbit (possibly via Sub-Orbital Flight)

Maneuver spacecraft to Mars Orbit (5, 3 time), discarding the Atlas

Maneuver spacecraft to Mars (0)

Phobos Sample Return

With the Surveying advancement, can also satisfy Mars Survey.

Requires the Rendezvous and Landing advancements. Payload to Earth Orbit is 16.

Assemble Soyuz, Atlas, two Juno and Probe on a stack for Earth Orbit

Maneuver spacecraft to Earth Orbit (possibly via Sub-Orbital Flight)

Maneuver spacecraft to Mars Orbit (5, 3 Time), discarding Soyuz

Rendezvous separate return stage (Atlas) from spacecraft (probe, two Juno)

Maneuver spacecraft to Phobos (1), discarding Juno

Collect a Phobos sample

Rendezvous detach and abandon the probe

Maneuver spacecraft to Mars Orbit (1), discarding Juno

Rendezvous spacecraft with return stage

Maneuver spacecraft to Earth Orbit (5, 3 Time), discarding Atlas

Maneuver spacecraft to Earth (0)

Mars Sample Return

This also satisfies Mars Survey and Mars Lander.

Requires the Rendezvous and Landing advancements. Payload to Earth Orbit is 21.

Assemble Soyuz, two Atlas, three Juno and Probe on a stack for Earth Orbit

Maneuver spacecraft to Earth Orbit (possibly via Sub-Orbital Flight)

Maneuver spacecraft to Mars Orbit (5, 3 Time), discarding Soyuz and Atlas

Rendezvous separate return stage (Atlas) from spacecraft (probe, three Juno)

Maneuver spacecraft to Mars (0)

Collect a Mars sample

Rendezvous detach and abandon the probe*

Maneuver spacecraft to Mars Orbit (3), discarding three Juno

Rendezvous spacecraft with return stage

Maneuver spacecraft to Earth Orbit (5, 3 Time), discarding Atlas

Maneuver spacecraft to Earth (0)

Mars Station

This also satisfies Mars Survey and Mars Lander.

Requires the Life Support, Re-Entry and Landing advancements. Takes one astronaut. Risk from solar radiation. Payload to Earth Orbit is 15.

If you know Mars has Supplies when you set out, you can omit one of the Supplies.

Assemble Soyuz, 4 Supplies, Vostok on a stack for Earth Orbit

Maneuver spacecraft to Earth Orbit (possibly via Sub-Orbital Flight)

Maneuver spacecraft to Mars Orbit (5, 3 time), discarding Soyuz and consuming 3 Supplies

Maneuver spacecraft to Mars (0)

End year check Life Support outcome and consume one Supplies

Man on Mars and Back

Requires the Rendezvous, Life Support, Landing and Re-Entry advancements. Takes one astronaut. Risk from solar radiation. Payload to Earth Orbit is 47.

Assemble Saturn, Soyuz, 2 Atlas, Vostok and 6 Supplies on a stack for Earth Orbit

Maneuver spacecraft to Earth Orbit (possibly via Sub-Orbital Flight)

Maneuver spacecraft to Mars Orbit (5, 3 time), discarding Atlas and Saturn and consuming 3 Supplies

Rendezvous separate return stage (Soyuz, 3 Supplies) from spacecraft (Vostok, Atlas)

Maneuver spacecraft to Mars (0)

Maneuver spacecraft to Mars Orbit (3), discarding Atlas

Rendezvous spacecraft with return stage

Maneuver spacecraft to Earth Orbit (5, 3 time), discarding Soyuz and consuming 3 Supplies

Maneuver spacecraft to Earth (0)

This also satisfies Mars Survey and Mars Lander.

A variant of this mission can also satisfy Mars Station; either run it as-is if Mars has native Supplies, or add one Supplies and upgrade the Atlas to a Soyuz for the leg from Earth Orbit to Mars Orbit, bringing payload to Earth Orbit to 52.

You can collect a Mars Sample to satisfy Mars Sample Return without changing any of the rockets.

Venus

Venus Survey

Requires the Surveying advancement. Payload to Earth Orbit is 6.

This also satisfies Ceres Survey; survey before manoeuvering out of Inner Planets Transfer.

Assemble Atlas, Juno and Probe on a stack for Earth Orbit

Maneuver spacecraft to Earth Orbit (possibly via Sub-Orbital Flight)

Maneuver spacecraft to Inner Planets Transfer (3, time), discarding the Atlas

Maneuver spacecraft to Venus Fly-By (2, time), discarding the Juno

Survey Venus from Venus Fly-By

Venus Lander

Payload to Earth Orbit is 8.

This also satisfies Venus Survey. It can satisfy Ceres Survey if you have the Surveying advancement; survey before manoeuvering out of Inner Planets Transfer.

Assemble Atlas, three Juno and Probe on a stack for Earth Orbit

Maneuver spacecraft to Earth Orbit (possibly via Sub-Orbital Flight)

Maneuver spacecraft to Inner Planets Transfer (3, time), discarding Atlas

Maneuver spacecraft to Venus Orbit (3, time), discarding three Juno

Maneuver spacecraft to Venus (0)

Venus Sample Return

Requires the Rendezvous advancement. Payload to Earth Orbit is 34 with a later launch of 7.

This also satisfies Venus Survey and Venus Lander. It can satisfy Ceres Survey if you have the Surveying advancement; survey before manoeuvering out of Inner Planets Transfer.

Assemble two Soyuz, three Atlas, three Juno and Probe on a stack for Earth Orbit

Maneuver spacecraft to Earth Orbit (possibly via Sub-Orbital Flight)

Maneuver spacecraft to Inner Planets Transfer (3, time), discarding Soyuz and Atlas

Maneuver spacecraft to Venus Orbit (3, time), discarding Soyuz

Rendezvous separate return stage (three Juno) from spacecraft (probe, two Atlas)

Maneuver spacecraft to Venus (0)

Collect a Venus sample

Rendezvous detach and abandon the probe

Maneuver spacecraft to Venus Orbit (6), discarding two Atlas

Rendezvous spacecraft with return stage

Maneuver spacecraft to Inner Planets Transfer (3, time), discarding Atlas

Assemble Atlas and three Juno on a stack for Earth Orbit

Maneuver final stage to Earth Orbit (possibly via Sub-Orbital Flight)

Maneuver final stage to Inner Planets Transfer (3, time), discarding Atlas

Rendezvous final stage with spacecraft

Maneuver spacecraft to Earth Orbit (3, time), discarding three Juno

Maneuver spacecraft to Earth (0)

Venus Station

Requires the Life Support and Re-Entry advancements. Takes one astronaut. Risk from solar radiation. Payload to Earth Orbit is 17.

This also satisfies Venus Survey and Venus Lander. It can satisfy Ceres Survey if you have the Surveying advancement; survey before manoeuvering out of Inner Planets Transfer.
If you know Venus has Supplies when you set out, you can omit one of the Supplies.

Assemble 3 Atlas, 3 Supplies, Vostok on a stack for Earth Orbit

Maneuver spacecraft to Earth Orbit (possibly via Sub-Orbital Flight)

Maneuver spacecraft to Inner Planets Transfer (3, time), discarding 2 Atlas and consuming 1 Supplies

Maneuver spacecraft to Venus Orbit (3, time), discarding Atlas and consuming 1 Supplies

Maneuver spacecraft to Venus (0)

End year check Life Support outcome and consume one Supplies

Man on Venus and Back

Requires the Rendezvous, Life Support and Re-Entry advancements. Takes one astronaut. Risk from solar radiation. Payload to Earth Orbit is 47 with a later launch of 9.

This also satisfies Venus Survey and Venus Lander. It can satisfy Ceres Survey if you have the Surveying advancement; survey before manoeuvering out of Inner Planets Transfer.

Assemble 4 Soyuz, Atlas, Juno, Vostok and 4 Supplies on a stack for Earth Orbit

Maneuver spacecraft to Earth Orbit (possibly via Sub-Orbital Flight)

Maneuver spacecraft to Inner Planets Transfer (3, time), discarding Soyuz and two Atlas and consuming 1 Supplies

Maneuver spacecraft to Venus Orbit (3, time), discarding Soyuz and consuming 1 Supplies

Rendezvous separate return stage (Atlas, Supplies) from spacecraft (Vostok, Soyuz)

Maneuver spacecraft to Venus (0)

Maneuver spacecraft to Venus Orbit (6), discarding Soyuz

Rendezvous spacecraft with return stage

Maneuver spacecraft to Inner Planets Transfer (3, time), discarding Atlas and consuming 1 Supplies

Assemble 2 Atlas and Supplies on a stack for Earth Orbit

Maneuver final stage to Earth Orbit (possibly via Sub-Orbital Flight)

Maneuver final stage to Inner Planets Transfer (3, time), discarding Atlas

Rendezvous final stage with spacecraft

Maneuver spacecraft to Earth Orbit (3, time), discarding Atlas and consuming 1 Supplies

Maneuver spacecraft to Earth (0)

Mercury

Mercury Survey

Requires the Surveying advancement. Payload to Earth Orbit is 9.

Assemble 2 Atlas and Probe on a stack for Earth Orbit

Maneuver spacecraft to Earth Orbit (possibly via Sub-Orbital Flight)

Maneuver spacecraft to Inner Planets Transfer (3, time), discarding Atlas

Maneuver spacecraft to Mercury Fly-By (5, time), discarding Atlas

Survey Mercury from Mercury Fly-By

Mercury Lander

This also satisfies Mercury Survey.

Requires the Landing advancement. Payload to Earth Orbit is 23.

Assemble Atlas, two Soyuz and Probe on a stack for Earth Orbit

Maneuver spacecraft to Earth Orbit (possibly via Sub-Orbital Flight)

Maneuver spacecraft to Inner Planets Transfer (3, time), discarding Soyuz

Maneuver spacecraft to Mercury Fly-By (5, time), discarding Soyuz

Maneuver spacecraft to Mercury (4), discarding Atlas

Mercury Sample Return

This also satisfies Mercury Survey and Mercury Lander.

Requires the Rendezvous and Landing advancements. Payload to Earth Orbit is 65 with a later launch of 7.

Assemble 2 Saturn, Soyuz, 3 Atlas, 3 Juno, and Probe on a stack for Earth Orbit

Maneuver spacecraft to Earth Orbit (possibly via Sub-Orbital Flight)

Maneuver spacecraft to Inner Planets Transfer (3, time), discarding Saturn

Maneuver spacecraft to Mercury Fly-By (5, time), discarding Saturn

Maneuver spacecraft to Mercury Orbit (2, time), discarding two Atlas

Rendezvous separate return stage (Soyuz) from spacecraft (probe, 3 Juno)

Maneuver spacecraft to Mercury (2), discarding two Juno

Collect a Mercury sample

Rendezvous detach and abandon the probe

Maneuver spacecraft to Mercury Orbit (2), discarding Juno

Rendezvous spacecraft with return stage

Maneuver spacecraft to Inner Planets Transfer (7, time), discarding Soyuz

Assemble Atlas and three Juno on a stack for Earth Orbit

Maneuver final stage to Earth Orbit (possibly via Sub-Orbital Flight)

Maneuver final stage to Inner Planets Transfer (3, time), discarding Atlas

Rendezvous final stage with spacecraft

Maneuver spacecraft to Earth Orbit (3, time), discarding three Juno

Maneuver spacecraft to Earth (0)

Ceres

Ceres Lander

Requires Landing. Payload to Earth Orbit is 9.

Assemble two Atlas and Probe on a stack for Earth Orbit

Maneuver spacecraft to Earth Orbit (possibly via Sub-Orbital Flight)

Maneuver spacecraft to Inner Planets Transfer (3, time), discarding Atlas

Maneuver spacecraft to Ceres (5, time), discarding Atlas

Reveal Ceres tile

Ceres Sample Return

This also satisfies Ceres Lander.

Requires the Rendezvous and Landing advancements. Payload to Earth Orbit is 23 with a later launch of 7.

Assemble 2 Soyuz, Atlas and Probe on a stack for Earth Orbit

Maneuver spacecraft to Earth Orbit (possibly via Sub-Orbital Flight)

Maneuver spacecraft to Inner Planets Transfer (3, time), discarding Soyuz

Maneuver spacecraft to Ceres (5, time), discarding Soyuz

Collect a Ceres sample

Rendezvous detach and abandon the probe

Maneuver spacecraft to Inner Planets Transfer (5, 2 time), discarding Atlas

Assemble Atlas and three Juno on a stack for Earth Orbit

Maneuver final stage to Earth Orbit (possibly via Sub-Orbital Flight)

Maneuver final stage to Inner Planets Transfer (3, time), discarding Atlas

Rendezvous final stage with spacecraft

Maneuver spacecraft to Earth Orbit (3, time), discarding three Juno

Maneuver spacecraft to Earth (0)

Anywhere

Extraterrestrial Life on Earth

Life may potentially be found on the Moon (one chance in four), Mars (one in three) or Venus (one in four); sample return missions will get it back to Earth.