



# *KERBAL SPACE PROGRAM*

## *STARTUP GUIDE*





# ACKNOWLEDGEMENTS



We would like to thank David Toomey and the rest of the English 382 class for listening to our hairbrain ideas. Thanks to Annie, Alex, Christina, Amy, and Gub the rat for keeping Riona sane-ish Thanks again to Christina for allowing Riona to stay up for several hours with the lights on working on this project. Thanks to Chris specifically for allowing himself to be roped into the project. Thank you to everyone who helped make this print guide, along with the online manual, possible.

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# INTRODUCTION



Hello and welcome to the Kerbal Space Program Startup Guide. We are the last two CEOs of the Space Center, before you. You may have come here to gain insight into why your rockets keep exploding, or perhaps because you can't figure out how to stay in orbit. We know those Kerbals and Kerbalinas are counting on you to get them into space so we're to help. Everything from starting a game to returning to Kerbin from orbit is in this guide.

Before introducing you to the mechanics of the game, there is a brief welcome speech every employee must attend including a tour around the Space Center campus, Kerbin, and the planetary system. There is also a meet and greet with the higher ups you will be interacting with. You can get to work after the festivities. Be sure to grab some cake for the road.

When it's time to start the game, we're here for you. The second section in here was created with you in mind. There are quite a few modes, difficulties, and sliders to go through. Some of the more basic aspects of the game such as making Funds and Science are discussed in the fourth and fifth sections more formally. Don't worry, you don't have to take notes; the slides will be posted online and in this guide.

The team has put together a detailed list of rocketry parts and how to use them. This section includes instructions on how to build a basic rocket. Some experimentation may be involved, don't worry about the little Kerbals walking below your rockets, they won't judge you. There is important information about your first launch and flight.

Once you have the basics of building a rocket down, we teach you more complex ideas behind rocketry such as staging and decoupling. The last two methods we have to teach you are how to get out of orbit once there and how to land without exploding. We recognize these are quite difficult to do on your own, even with help. The goal here is to get you safely into orbit and return back to Kerbin. However, in the end it is up to you to create the ship that gets into space and keep it there. Good luck.

Best Wishes,

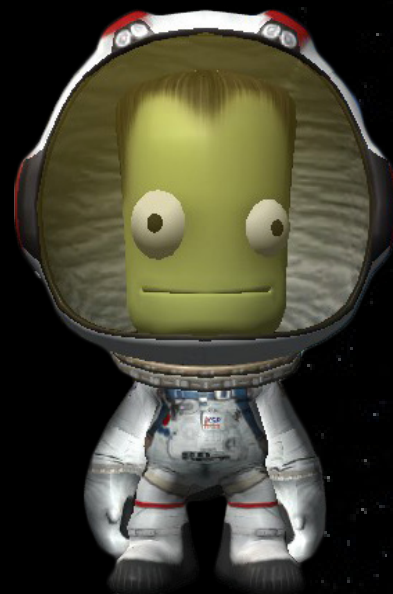
Chris and Riona

Welcome to Kerbal Space Program!

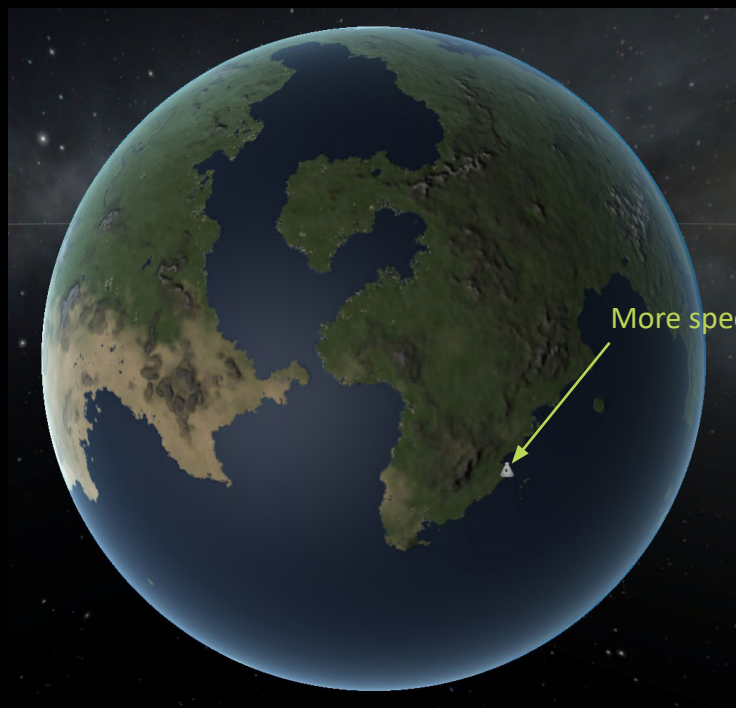
You are about to embark on the journey of a Kerbal's lifetime. Kerbals are these squat little green guys. They have "female" equivalents called Kerbalinas. There are no real sexes here, just green aliens. They inhabit the planet Kerbin, but wish to explore their planetary system orbiting Kerbol, their star. You are here to help the Kerbals with their space program. Or to make rockets explode. Either way, you are going to learn a lot about physics and rocket science.

You will be working mostly within the Space Center. When you start Career Mode, it doesn't look like much but, as you upgrade the facilities, the campus map will start to fill out. Having fewer dirt roads looks better to investors, that's all I'm saying.

On the next page, you can meet the staff you will be interacting with frequently throughout the game.







## MEET AND GREET

On your right you can see the higher-ups you will be working with here at the Kerbal Space Program. They all apologize for not being able to make this meeting. Every single of them came down with a nasty case of the “Goose pox”, though there are no geese on this planet. Strange, I thought I saw Wernher in his office at lunch. Anyway, they sent us their headshots instead so you know what they look like.

The top row is your advisory board. You can set up a meeting with them by simply entering the Administration Building at any time. None of them have a life outside of this job, come to think of it, outside of that building. Mortimer is the Funds expert, you can go to him to start fundraising campaigns and patent licensing. Linus is technically only an intern, but you can still ask him about Science related subjects. He can answer any questions on unpaid research programs, outsourcing Research and Development, and selling research rights. I’m sure he’s had some experience with that stuff in a past internship. Walt is our resident wiseguy and the face of Public Relations. He likes to wear that hazmat suit because it “seems appropriate to wear in such a toxic environment.” You can go to him on Reputation matters such as starting appreciation campaigns, open-source tech programs, or “Bai-Out Grants”. Gus is our good ol’ repairman, and very active in the organization. He’s willing to talk you through aggressive negotiations, leadership initiatives, and the Recovery Transponder fitting.

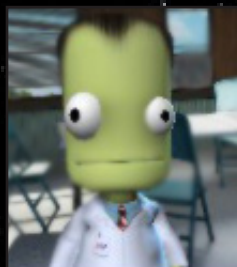
The astronauts tend to hang out amongst themselves in the Astronaut Complex. The four astronauts you begin with are Jebediah, Valentina, Bill, and Bob. The three of them are equal in experience to begin with, though some are a bit more... excitable than the others. Finally, the last two are Wernher Von Kerman and Gene. Wernher spends his time working in his office in the Research and Development building. It’s located in the Science Archives, don’t be afraid to knock. Gene is generally more willing to chat, he even gives you a thumbs up every time you walk through the Mission Control door. He is available to discuss contracts the program is willing to take on over a cup of joe. I’m not sure how he secures these contracts, but they just keep coming, just like his coffee.

Well, that’s the whole team, or rather, everyone worth naming. Time to get to work!

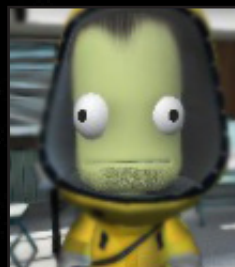




Mortimer Kerman



Linus Kerman



Walt Kerman



Gus Kerman



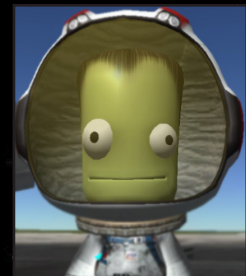
Jebediah Kerman



Valentina Kerman



Bill Kerman



Bob Kerman



Wernher Von Kerman



Gene Kerman

## STARTING A NEW GAME

Great! You want to start a new game but aren't sure which type of game you want to choose, or perhaps how some of the options truly affect the difficulty of the game.

1. Click **Start Game**. The **Start Game** screen comes into view.  
Click **Start New**. The Start New Game dialog box appears.
2. Enter a **Player Name**.
3. Click on the **Flag** button. The **Choose a Flag** dialog box appears.
4. Select the flag you wish to represent you. Click **Accept** to exit.
  - Note: Cannot automatically type in name box again
  - Note: You can change the flag later in the game, this is not permanent
5. Choose the **Game Mode** you wish to play in. For the purposes of this guide, we will be going with **Career Mode**.
  - Sandbox is the mode where you have unlimited supplies.
  - Science is the mode where you have unlimited Funds and don't have to worry about your Reputation, it's all about 'dem Science points.
  - Career is the mode where everything is limited and you must juggle your Science, Funds, and Reputation.
6. Click the **Difficulty Options** button. The Game Difficulty dialog box appears.
  - **General Options** affect common gameplay events such as flights, loading, respawning, and facilities.
  - **Advanced Options** affect the forgiving was of the environment, penalties, and rewards.
  - **Career Options** affect the Funds, Science, and Reputation you begin with. These are the three key elements you must juggle in the game.
7. Select one of the preset difficulties: Easy, Normal, Moderate, or Hard.
8. Make changes within the **General Options**, **Advanced Options**, and **Career Options**.
  - Note: If you make any changes the difficulty will automatically change to **Custom** difficulty.
9. Click the **Accept** button when you are satisfied with the difficulty.
10. Click the Start! Button.

You have started a game!

## EXPLAINING PART TYPES

In Kerbal Space Program, there are 8 categories of rocket parts. As shown in the below image the part types are:

### Command Modules:

These are the brain of the rocket. Whether or not it is a smart brain is really up to you. Command modules can be broadly put into two sub-categories: Manned and unmanned. Manned command modules need a certain number of astronauts inside them to operate. Without an astronaut in the command module, the player cannot control the rocket at all. Unmanned modules do not contain astronauts, and instead use electricity to control the rocket. No electricity, no control. Each of these options has pros and cons, but in the beginning you will only have access to manned modules.

### Fuel Tanks:

Fuel is arguably the most important resource you have. Without fuel you cannot go anywhere, and in some cases you cannot make navigational adjustments. There are four types of fuel that you can use, but only three of them are accessible in this menu:

### Solid Fuel:

Solid fuel is only found in solid fuel boosters and is not found in this menu. What makes it different is that once you have activated a solid fuel booster, you cannot turn it off. The fuel burns at 100% burn until there is no more to burn.



### Liquid Fuel:

Liquid fuel is the most common type of fuel you will be working with. Liquid fuel can be throttled as necessary so it is used for mid-to-late stages of your flight for more fine points of navigation. Liquid fuel comes in two parts: liquid fuel and oxidizer. These two resources burn at a proportional rate, and each fuel tank has the correct ratios of fuel to oxidizer, so it is rarely a consideration, but if for some reason your rocket stops moving despite having some fuel left it may have to do with a lack of oxidizer.



## EXPLAINING PART TYPES

### Monopropellant:

Monopropellant is liquid fuel without oxidizer and is used as fuel for Reaction Control System (RCS) thrusters.



### Xenon Gas:

Xenon gas tanks are used to fuel ion engines.



### Engines:

As easy as it can be to consider engines as the workhorse of rockets with little variation (we want the biggest engines to make the rocket go fast, right?), there are many nuances to engines, with many different types of engines, all with differing capabilities. Each engine utilizes one of the fuel types as discussed above, and each of these engine types has pros and cons as well and some general archetypes of use.

### Solid Fuel Booster:

Due to the high power of a solid fuel booster and the fact that it cannot be turned off until no fuel is left, solid fuel boosters are most often used to begin a flight. They create incredible amounts of lift and acceleration and create a solid (haha) foundation for the remainder of the flight. Often a solid fuel booster is paired with a decoupler to allow for it to be easily jettisoned once it has been used up.

### Liquid Fuel Booster:

As noted in the section on liquid fuel tanks, the key component of liquid fuel is that it can be throttled. Liquid fuel engines allow for much more precision at the cost of power. A liquid engine set to max will not give the same level of acceleration as a solid fuel engine, but once a high velocity has been established, the liquid fuel engine will easily be able to maintain that velocity.



## EXPLAINING PART TYPES

**RCS Thruster:** Reaction Control System thrusters are small, radial-mounted thrusters designed to use a small boost to help turn the ship. These thrusters use monopropellant to generate small thrusts that assist you in turning or rotating your ship.

### Ion Engines:

Ion engines are small and run on either xenon gas or electricity. Because they can run on electricity many ion engines are used in space probes or in rockets that will have to be in space for a long time where being able to refuel with solar power allows for near endless usage. Ion engines are weak, though, especially in atmospheric conditions and it is almost impossible to launch a rocket with only an ion engine.



### Command and Control:

Command and control is all about the parts that help you steer your rocket. Stability Augmentation System (SAS) parts are found here along with inline reaction wheels. Inline reaction wheels provide more torque when turning, which results in a more responsive ship.

### Structural:

Structural contains everything that helps keep the spaceship together (or in some cases, precisely take it apart). Structural contains decouplers, which use small explosions to disconnect and push parts off and away from the spaceship. This is especially useful for parts of the ship that are no longer of use, such as empty fuel tanks or empty solid state boosters. Structural also contains adapters, couplers, and struts, all of which help keep a rocket stable and together. Structure also contains the stability enhancer, which helps keep the rocket upright before launch.



### Aerodynamics:

Aerodynamics contains all of the parts needed to help give your ship more aerodynamic capabilities. This includes fins, wings, nose cones, and much more.

## EXPLAINING PART TYPES

### Utility:

Utility is a massive category, and mostly contains advanced spaceship parts. The more basic utility features include landing gears, parachutes, ladders, batteries and electric generators, lights, wheels, and radiators. There are more features, but these are for advanced missions that this guide will not be covering.

### Science:

Science contains all of the instruments used to conduct science experiments and get science points. These can range from things like mystery goo to thermometers to barometers. Importantly, science also contains communication systems, which help transmit data back to Kerbin.



## BUILDING THE ROCKET

Now that we know our way around the interface, we can start to build our first rocket. This rocket will be basic, but it will follow the same building paradigms that will show up in all subsequent rockets. To begin building your rocket, from the main game screen, click on the Vehicle Assembly Building.

1. We begin with the command module. All we have available to us is the **Command Pod Mk1** at the start so we will place that in our canvas.
2. There are two options available for how to attach the **RT-5 "Flea" Solid Fuel Booster**.
  - **Explosive Decoupling:** This means just stacking the boosters on top of one another. When the bottom-most booster is depleted, the next one will fire off and after a few seconds, the heat will explode the depleted booster and the rocket will continue upwards. This will require creating a new stage for each booster. Go to the **Staging** section to read more about staging.
  - **Girder-Attached Boosters:** This is based around placing one booster and then setting Symmetry to 3 and placing three **Modular Girder Segments** around that middle booster, then finally placing a booster on each girder segment.
3. Place an **Mk16 Parachute** on the top of the command module.
4. Place some **Basic Fins** on either the middle booster or on the three girder-attached boosters.
5. If you would like, place a **Mystery Goo Containment Unit** on the command module. This unit helps you get more science points, which gives you more parts at a faster rate.

Now that you have a rocket, it is time to launch it!

## FIRST LAUNCH

You will simply be launching your rocket up into the air this time. Since there is really no way to get it much higher than a few thousand meters, the purpose of this launch (and likely one more launch after) is to get you acquainted with the process of actually piloting your rocket. To get started, click on the green Launch button in the top right corner of the Vehicle Assembly Screen.

## A Quick Explanation of the Launch Screen

The launch screen is composed of a few important things.

- In the top left corner is the **Time Warp Indicator**. This lets you know how long the current mission has been going on for and if you are using the time warp function. With no time warp, there should be no arrows showing. When you do time warp ("," and "." keys), arrows will show in the indicator to indicate how fast you are warping.

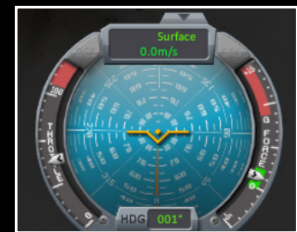
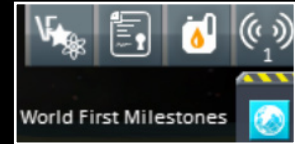


- In the top middle is the **Altimeter**. This tells you what your velocity, height, and atmospheric status is. You can also control geared parts, lights, and brakes with this. The ticker numbers indicate your height, and are measured in meters and then can roll over to measure in kilometers if you are sufficiently far out. The grey indicator is your velocity. Positive velocity means that you are going forwards or up at speed. Negative velocity means you are going backwards or down at speed. The atmosphere gauge indicates which level of the atmosphere you are in, with fully right being on the ground and fully left being in space outside of atmosphere (70,000 meters). If you hover over the top of the dashboard options to access the **Recover Vessel** and **Space Center** options. These options let you go back to the main game menu and either recover the rocket and crew (along with any retrieved science) if they have landed anywhere on Kerbin or just go back to the space center and leave the rocket where it is. The yellow and black striped section on the left of the dashboard can be hovered over as well to reveal the **Abort Mission** button, which ends the mission immediately, not recovering anything.



## FIRST LAUNCH

- The top right corner contains information such as fuel levels, rocket information, communications from mission control, and contracts. These can all be hovered over to reveal that information.
- The bottom right corner contains profiles for all of your Kerbals. Hovering over their portraits will give you the **View** and **EVA** options. View lets you see from their perspective inside the command module. This view can be exited by default by pressing the C key. EVA sends the Kerbal outside of the rocket, and lets them perform exploratory operations in space or on the ground. Avoid going EVA while the rocket is in motion.
- The bottom middle has the second dashboard. This is dominated by the Directional Ball. The **Directional Ball** is designed for steering. If the rocket is facing directly upwards then the ball will be set to 0 in the middle of the blue half. Moving the rocket in any direction causes the ball to move accordingly. The ball notates the degrees in which the rocket is turning. Blue means the rocket is facing upwards, orange means the rocket is facing downwards. There are two green symbols on the ball which we will get into later when getting into orbit, but for now just try to keep the rocket from turning too much. To the right side of the ball is the **G-Force Indicator**. G-Force will not be a concern for us, but if the G-Force Indicator stays in the red for too long, our Kerbals can die and certain rocket parts can be destroyed. To the left side of the ball is the **Throttle**. This is controlled with the left-side **Shift** and **Control** keys by default. Since we are not using liquid fuel yet, the throttle controls nothing, but in the future we will be using it quite extensively.
- The bottom-left contains directional indicators such as pitch, roll, and yaw. These are primarily used for docking, which we will not be covering in this guide.



## FIRST FLIGHT


Time to fly!

1. Press **Space** to activate the solid fuel boosters. These will boost until they are out of fuel. Depending on which type of rocket you chose to make you will either wait until they all run out or keep pressing **Space** to activate the next booster on the line.
2. Right-click on the command module and click **Crew Report**. The science window appears.
3. Click **Keep Experiment**. This will give you science points when you recover the vessel. Do the same process with the Mystery Goo if you attached it.
4. When all of the boosters are out of fuel and your velocity is heading back down to 0, press **Space** one more time to activate your parachute. The parachute will deploy and slow down your rocket once you reach 1000 meters above the ground.
5. Your rocket will hit the ground and it is very likely that your boosters will explode, but your command module will stay intact.
6. Click **EVA** on your Kerbal's portrait to send them out. Have them let go of the ladder.
7. Right-click on your Kerbal and then click **EVA Report**. The science window appears.
8. Click **Keep Experiment**.
9. Hover to the top of the altimeter and click **Recover Vessel**. You return to the main game screen.

Do this launch a few more times to practice and get more science points. When you have unlocked **Engineering 101** and **Basic Rocketry** you may continue on to the next section of this guide. Happy flying!

## EARNING FUNDS

Building, flying, and maintaining rockets is not a cheap business so you're going to have to make money somehow. Fulfilling contracts with various companies and bodies of government through Mission Control is the main way to earn Funds.


1. Enter the Kerbal **Space Center** campus map.
2. Click on the **Mission Control** building. The Contract interface appears with a list of contracts.
3. Click the **Available** tab to browse new contracts. Click the **Active** tab to check the contracts you are currently working on. Click the **Archives** tab to see past contracts.
  - Note about Archives: Sort by: All, Completed, Failed, Cancelled.
  - Note: Stars denote the difficulty of the contract.
4. Select the contract you want to enter. The contract details appear on the right side of the interface.
  - The **Advance** is the Funds you receive upon accepting the contract.
  - **Completion** is the rewards you will receive in Funds, Science, and Reputation, respectively, upon completion of the **Objectives**.
  - The Funds and Reputation are subtracted upon the Failure of a contract by way of expiration or cancellation.
5. Click the **Accept Contract** button . The contract is available in the Active tab.
  - Note: You can only work on three contracts at a time. You may exit a contract at any time and you will not incur the Failure penalty, but the Advance you received upon accepting the contract will be extracted from your Funds.
6. Complete the contract objectives to receive the **Completion** awards.

Now you're rolling in the Funds!

# 16 MAKING AND USING SCIENCE POINTS

## SCIENCE BEGINNING STEPS

To progress in KSP's Career mode, you need to upgrade your Technology. To upgrade your technology, you must collect Science points. There are a number of ways to collect these points ranging from walking on Kerbin to landing on the Mun.

1. Open a new or existing game file.
2. Click on the Research and Development building.
3. Click the **Science Archives** button  in the upper left corner of the window to keep track of science progress.

Here are the many different ways to get science:

Note: Different celestial bodies will have different experiments conducted around them.

Note: Repeating the same action or event will give you fewer and fewer Science points.

Experiencing a new: Situation, Activity, Biome

**Situations** are based on flights and landings. Different celestial bodies affect what flight situations you can experience. There are two types of landings: landed, when a ship has landed and

**Activities** are experiments you can complete, for example an Extra-vehicular Activity. Certain activities are based on the celestial body or biome.

**Biomes** are types of surfaces on celestial bodies, for example, deserts, mountains, oceans, the poles of the planet.

Doing an **EVA Report** example:

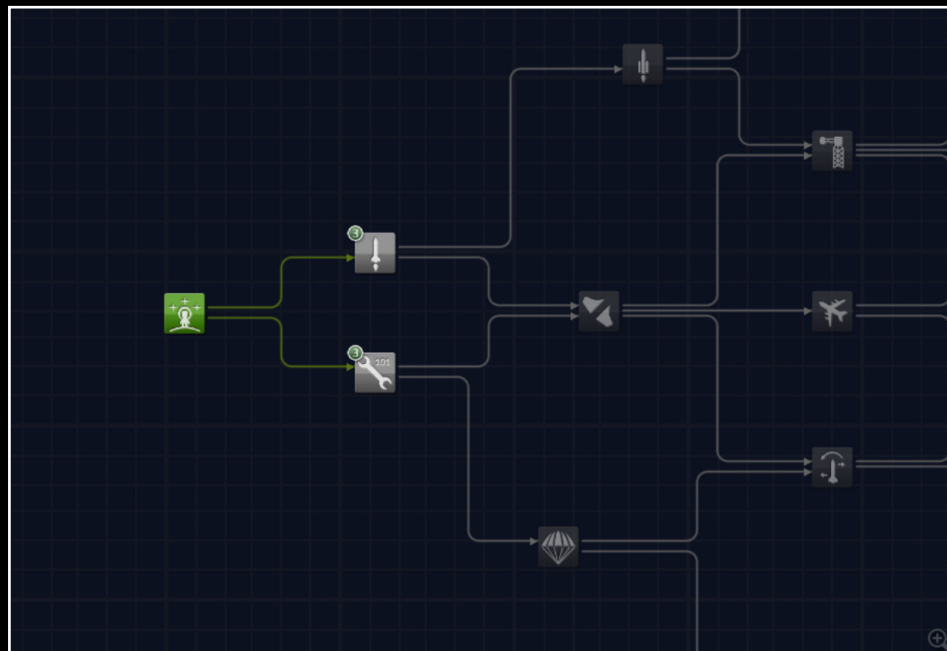
To do an EVA report, you must land without exploding and have your Kerbal or Kerbalina exit the ship.

1. Land your vessel.
2. Hover over their live feed in the bottom right corner.
3. Click the **EVA** button. Your Kerbal exits the vessel and automatically begins an EVA report.





- You now know how to make and use Science! For more information, the steps in **Flying to Space** include experiment examples.



## BUILDING YOUR NEXT ROCKET

So after a few times going up and then falling back down with nothing but a few solid boosters hopefully you have acquired enough science points to upgrade to liquid fuel boosters and fuel tanks, as well as a decoupler. These upgrades are found in the first two unlockable level of the tech tree found in the R&D building, **Basic Rocketry** and **Engineering 101**. This section assumes you have access to the parts from these two levels, so do not begin this until you have unlocked them.

1. Place a **Mk1 Command Pod** on the canvas.
2. Place a **Mk16 Parachute** on top of the command module.
3. If you want extra science from your trip (and you likely do), place a **SC-9001 Science Jr.** under the command pod.
4. Place a **Communotron 16** on the side of your command pod.
5. Place a **TR-18A Stack Decoupler**. This will segment your rocket. The stack decoupler, when activated, separates your rocket. You will retain control of everything above the decoupler and everything below will be jettisoned.
6. Under the decoupler, place about six **FL-T100 Fuel Tanks** on top of each other. Each of these holds a little bit of fuel for your liquid fuel engine, and they also provide the body of the rocket.
7. Place a **LV-T30 "Reliant" Liquid Fuel Engine** at the bottom of the fuel tanks.
8. Place another **TR-18A Stack Decoupler** below the engine. This creates a casing around the engine that makes it flush with the rest of the rocket's body. This is a fairing, and when you activate the decoupler the fairing will automatically jettison.
9. Finally, place a **RT-10 "Hammer" Solid Fuel Booster** below the second decoupler.



Your second rocket is complete! This one is considerably more complex than the last one, with a number of segmented parts. Think of each section as a stage, separated by a decoupler, because now we are going to talk about staging.

## STAGING

Staging refers to the phases that you use when activating parts of the rocket. You have two boosters on your rocket, so you do not want them both to start at the same time (unless you love explosions (you can love explosions, it's okay)). In the bottom right-hand corner of the vehicle assembly screen, you can see the current staging setup. The way this works is that the highest number is the first activated staging, and then each smaller one goes next. You will be using four stages. Let us go over how to add stages and move actions between them.

1. Hover over the **Stages**. You see a plus sign and minus sign.
2. Click the plus sign to add an empty stage, and do that until you have a total of four stages. If you have more than four, click the minus to remove them until you have four.
3. Drag the action for the solid fuel booster to stage 3.
  - Note: You can tell which is which by hovering over the icons and seeing which parts of the rocket are highlighted.
4. Move the action for the bottom decoupler and the liquid fuel engine to stage 2.
5. Move the action for the top decoupler to stage 1.
6. Make sure your parachute is set to stage 0.

Stages can be changed mid-flight as well, but this saves hassle and keeps you from activating everything at once.

With staging set to go, your second rocket is complete!



## BUILDING AN ORBITER ROCKET

Having made it into space, you are ready for the final part of this guide: getting a circular orbit around Kerbin. This is an important event, because everything you do that will take you outside of Kerbin will require you to be capable of creating an orbit. This is the first skill you will need to successfully perform missions to far-flung planets and moons. This part will go over what is needed to build an orbit-capable rocket. Before doing this section, ensure that you have unlocked **General Rocketry**, **Stability**, and **Survivability**, on top of the technologies described in the previous rocket building section.

1. Place a **Mk1 Command Pod** in the canvas.
2. Place a **Mk16 Parachute** on top of the command pod.
3. Place a **Science Jr.** under the command pod. We will be using the science jr this time not just for science, but also to slightly increase the size of our command section.
4. Place a **Heat Shield (1.25m)** under either the Science Jr. or the command pod.
5. Set **Symmetry** to 3.
6. Place a **LT-05 Micro Landing Strut** on the Science Jr. We use the Science Jr. for this, but in the future struts will often be placed on fuel tanks when you start building landers that need their own small engine.
7. Set **Symmetry** to 1.
8. Place a **Stack Decoupler** under the Science Jr.
9. Place 5 **FL-T200 Liquid Fuel Tanks** under the stack decoupler.
10. Place a **LV-T45 "Swivel" Liquid Fuel Engine** on the bottom of the rocket.
11. Set **Symmetry** to 3.
12. Place a **TT-38K Radial Decoupler** on the lower third of the rocket.
13. Place a **BACC "Thumper" Solid Fuel Booster** on the decoupler. Make sure that it is fully on the decoupler, as clipping issues can sometimes occur, causing improper separation.
14. Place an **Aerodynamic Nose Cone** on top of the solid fuel booster.
15. Place a **AV-T1 Winglet** in the middle of the solid fuel booster.
16. Click on the solid fuel booster you have placed to move it around. Ensure that all three solid fuel boosters and decouplers are set at a height such that the bottom of the solid fuel boosters are as equal as possible with the bottom of the liquid fuel engine.

17. Set the staging in this order (from bottom to top):

- Solid Fuel Boosters activate
- Radial Decoupler activates
- Liquid Fuel Engine activates
- Stack Decoupler activates
- Parachute activates

Now you are ready to boldly go and fly into a circle!

## FLYING TO SPACE

Functionally, flying to space is similar to your first few launches. Point up and go, right? Well, it's getting a little more complex now. We are using staging and we are capable of changing the intensity of our rockets now. The result is that we are looking at a good transition from simple piloting to the more difficult piloting required to attain orbit.

1. Set your throttle to a little less than one-third. Make sure all of your staging is correct. Now is the last chance.
2. Press **T** to activate **SAS**. If it is not already, set it to **Stability Assist** to the left of the navigation ball.
3. Press **Space** to activate the solid fuel booster. Let that burn out completely before activating the next stage.
4. Press **Space** once the solid fuel booster burns out to jettison it.
5. Press **Space** to activate the liquid fuel engine. Your throttle is at one-third so it should not be accelerating the rocket any undue amount. The rocket will start decelerating a little but the liquid fuel engine should keep it from falling below ~300. Keep track of this number using the speedometer next to the altimeter.
6. Keep your rocket steady while the liquid fuel slowly burns out. You want to at least make it to 70,000 meters, as anything lower is still within Kerbin's atmosphere.
7. At 70,000 meters or higher, right-click the **Science Jr.** and click **Conduct Experiment**. The science window appears.
8. Click **Send Experiment**. This will net you about 18 science points, which at this stage in the game is sizable.
9. Right-click on the command pod and click **Crew Report**. The science window appears.
10. Click **Keep Experiment**. More science points. Since you are not on the surface, you cannot go EVA.
11. Let the rocket run out of fuel and then click **Space** to jettison the unnecessary rest of the body.

At this point things can get dicey. If you have not gone too far out into space then you have a better chance of making it to the ground without a heat shield. During re-entry, progress bars appear on all of the parts of your spaceship. These are for overheating. If the bar fills up, the part overheats and explodes. The Science Jr. likely will not make it, which is why we chose to send the data earlier.



12. Wait to activate your last stage until the parachute icon in the staging section is no longer colored red or yellow. Otherwise the aero or heat forces may destroy the deployed parachute.
13. Press **Space** to activate the parachute when it is safe to do so.

Congratulations! You have just made it to space and back without exploding (too much)! This can be done a few more times to get enough science to unlock the next parts, which are important for the next section. You will need **General Rocketry**, **Stability**, and **Survivability**.

**Command Modules:** These are the brain of the rocket. Whether or not it is a smart brain is really up to you. Command modules can be broadly put into two sub-categories: Manned and unmanned.

**Engines:** Engines are the workhorse of rockets, with some variation all with differing capabilities. Each engine utilizes one of the fuel type.

**EVA (Extra-vehicular Activiy):**EVAs are the act of sending a Kerbonaut outside the vessel.

**Fuel Tanks:** Without fuel you cannot go anywhere, and in some cases you cannot make navigational adjustments. There are four types of fuel that you can use.

**Funds:** The monetary system through which you may purchase rocket pieces, new astronauts, and facility upgrades.

**Ion Engines:**

Ion engines are small and run on either xenon gas or electricity.

**Kerbol:** The star in this planetary system which Kerbin orbits.

**Kerbonaut:** A Kerbonaut is a Kerbal who works as an astronaut.

**Kerbal/Kerbalina:** Kerbals/Kerbalinas are the small green species that live on Kerbin.

**Kerbin:** The home planet of the Kerbals. The surface and physics are much like those on Earth.

**Liquid Fuel:** Liquid fuel can be throttled as necessary so it is used for mid-to-late stages of your flight for more fine points of navigation. Liquid fuel comes in two parts: liquid fuel and oxidizer.

**Liquid Fuel Booster:** Liquid fuel engines allow for much more precision at the cost of power.

**Minimus:** Minimus is the smaller of the two moons orbiting Kerbin.

**Mün:** The Mün is the larger of two moons orbiting Kerbin. As Kerbin is comparable to Earth, the Mün is similar Earth's Moon. This is where the menu screens are shot from.

**Monopropellant:** Monopropellant is liquid fuel without oxidizer and is used as fuel for Reaction Control System (RCS) thrusters.

**Nodes:** Nodes are the levels of technology in the Research and Development tech tree.

**Reputation:** Your reputation affects how the outside world views you, i.e. the quality and quantity of the contracts you are offered.

**RCS Thruster:** Reaction Control System thrusters are small, radial-mounted thrusters designed to use a small boost to help turn the ship.

**Science:** The point system measuring scientific achievements, usable only to unlock upgrades and new technology.

**Solid Fuel:** Solid fuel is a type a fuel wherein once you have activated a solid fuel booster, you cannot turn it off. The fuel burns at 100% burn until there is no more to burn.

**Solid Fuel Booster:** Due to the high power of a solid fuel booster and the fact that it cannot be turned off until no fuel is left. They create incredible amounts of lift and acceleration.

**Xenon Gas:** Xenon gas tanks are used to fuel ion engines.

*IMAGE CREDIT*

Čiomėnas, Dovydas. *Stars*. 2014. *Flickr*. Web. 2 May 2016. Altered image.

Squad. Kerbal Space Program. Computer software. Kerbal Space Program. Vers. 1.0 and 1.1. Squad, n.d. Web. <<https://kerbalspaceprogram.com/en/>>.

All Screenshots taken directly from the game.

