

SPACEX^{SFS}

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DRAGON USER'S GUIDE

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1. INTRODUCTION

1.1 USER'S GUIDE PURPOSE

This guide was provided for visitors of SpaceX - SFS which downloaded the blueprint from our website. This guide is applicable to the Dragon spacecraft blueprint, flight configuration, parts details etc. The user's guide may not be intended for spacecraft details due to version updates. SpaceX - SFS would update this user's guide immediately after the blueprint updated and uploaded into the website. Vehicle configuration and parts may change in the future updates which are different from this guide.

1.2 COMMUNITY DESCRIPTION

SpaceX - SFS is a Spaceflight Simulator community, created on July 8, 2020, representing the community which truly focused the thing at SpaceX Vehicles, Spaceflight Simulator is a game about building your own rocket from parts and launching it to explore space. You can build your own rocket, spacecraft, rovers, ground structure, orbital laboratory etc. Ariadi Saputra uses the SpaceX trademark name, in the purpose of branding among the Spaceflight Simulator apps community, which mostly build SpaceX rockets and Spacecraft, such as Falcon 9 and Falcon Heavy, Dragon Spacecraft and Starship, that's why we using the SpaceX trademark as "SpaceX - SFS", to represent SpaceX in the Spaceflight Simulator game version, were "SFS" is acronym of SpaceFlight Simulator.

1.3 DRAGON SPACECRAFT OVERVIEW

Dragon program created by SpaceX to provide human and cargo service into space. SpaceX operates Dragon launches from Falcon 9 vehicle facilities at Cape Canaveral Air Force Station and Vandenberg Air Force Base for cargo missions and Kennedy Space Center for Crew missions. SpaceX - SFS Dragon vehicle at Spaceflight simulator, designed, builded and configured similar to the real vehicles.

Dragon Configuration on Spaceflight Simulator :

Real vehicle		Spaceflight Simulator	
Diameter	4m	Width	4 tiles
Height	8.1m	Height	8.2 tiles
Mass	1.2 ton	Mass	35 ton
Max Payload	6 ton	Max Payload	5 ton

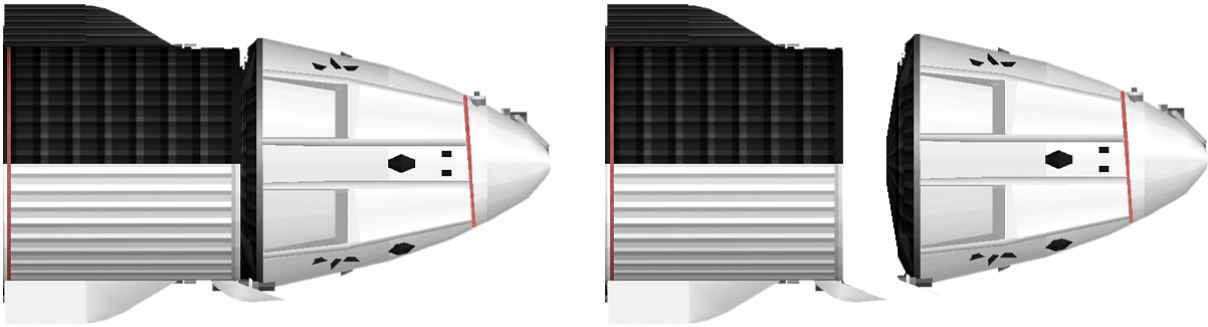


Figure 1: SpaceX - SFS Dragon Spacecraft

1.4 DRAGON RELIABILITY

Dragon spacecraft designed similar to real vehicle, with same size height and width ratio, on 1:1 to match vehicle size and human size in Spaceflight Simulator world which made it have some adjustment and modification and maybe was slightly different from real vehicle in performance or capability.

1.4.1 ENGINES

The Hawk Engine is a powerful but inefficient engine than RCS Thrusters and Ion Engine ISP. When active, it produces an orange-yellow flame. SpaceX - SFS using a couple Hawk Engines on the Capsule module as Escape Launch System.

Engines	Thrust	Mass	Fuel Consumption
Hawk Engine	120 ton	3.5 ton	0.5 ton
RCS Thruster	1.5 ton	0.05 ton	0.0125 ton

RCS Thruster

Similar to the Ion Engine, it does not need to be attached directly to a fuel tank and will always drain the closest tank. By tapping on any RCS thruster on the spacecraft, all RCS attached to the spacecraft will be activated and can only be used simultaneously.

The engine is commonly used for precise movements of spacecraft, either for docking or tiny orbital adjustments.

1.4.2 STRUCTURE

Dragon Spacecraft has two Modules, composed by Capsule and Trunk similar to the real vehicle version.

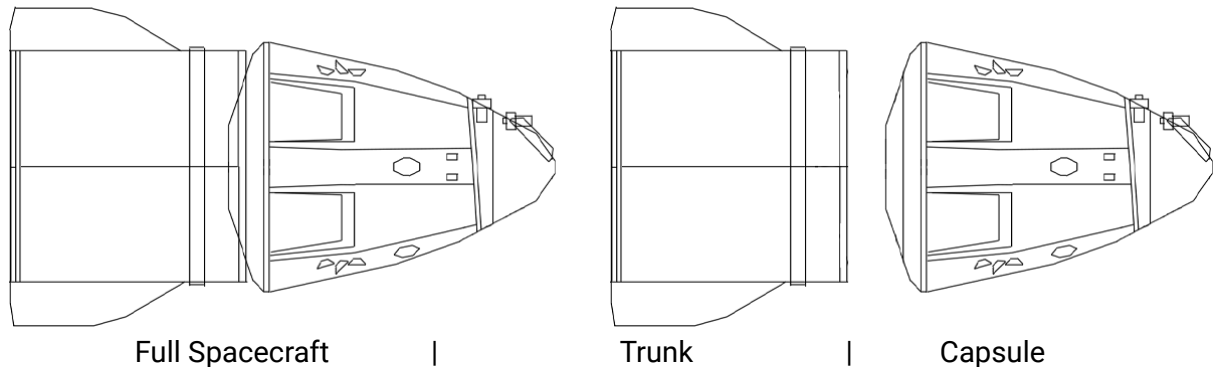


Figure 2: Vehicle Structure

2. SPACECRAFT

Descriptions and performance information may change in the future, contact ariadispacex@gmail.com for more suggestions.

2.1 DRAGON SPACECRAFT OVERVIEW

Dragon is a reusable spacecraft which is able to lift crew and cargo into space. The spacecraft is designed, built and operated by SpaceX. Dragon spacecraft can be modified to fly Cargo or Crew, the capsule module sits on the Trunk, a structure providing support during launch and a place for small cargo. Current update Dragon spacecraft performance is increased to maximize the thrust and match real vehicle capabilities.

2.3 STRUCTURE AND PARTS

2.3.1 CAPSULE MODULE

Capsule module is a pressurized section to allow humans for breathing (Astronaut update currently still on the works).

1. Engines

Capsule engines consists of :

- Hawk Engines (2 - toggleable)
- RCS Thruster (8 - fixed)

2. Fuel Tank

a 0% fuel tank with 4 tiles width builds up the capsule structure, simulates spacecraft empty pressurized sections and reduces mostly spacecraft weight.

3. Docking Ports

Docking port is used to allow the spacecraft to connect to other spacecraft, such as ISS or custom space station, deploy the cargo into orbit or the ISS cargo, provide Nose Cone reconnect to the vehicle while opened and used to detach or attach new Trunk and Nose Cone into the capsule.

4. Nose Cone

Nose cones minimize the aerodynamic drag during lift-off, a place for parachute housing and allow the docking port inside the nose cone to open.

2.3.2 TRUNK

Dragon trunk is a service module of the spacecraft, it provides all fuel needed for the Launch escape system and RCS, serving payload cargo section and structural support to attach on the Second stage, the part consist of :

1. Fairing

Fairing structure used to reduce the weight and provide space for the cargo.

2. Fuel Tank

Store all the fuel needed to operate the spacecraft.

3. Docking Port

Docking port is used to detach or re-attach a new trunk or nose cone into the Capsule to serve new parachute into the capsule, since parachute aren't reusable, so it need to build new one that placed on the nose cone, also the Trunk separated before re entry so it need to build new one to reuse the capsule.

3. DRAGON SPACECRAFT FLIGHT

3.1 PRE-FLIGHT

This guide only Dragon Spacecraft, for Satellite cargo payload read Falcon Fairing User's Guide.

3.1.1 BLUEPRINT LOCATION

After downloading the Blueprint files, consists of :

1. B 1074
2. Ds 2.7 - Trunk (With new second stage)
3. Ds 2.7 Capsule

Unzip the .zip files using File Manager Apps and Place on directory :

Android/data/com.StefMorojna.SpaceflightSimulator/files/Saving/Blueprints

3.1.2 REASSEMBLE

Due to the reusable mechanism required reassembly phase, follow these steps to reassemble the vehicle correctly.

1. From Build Menu, select "Load Blueprints" options
2. Load "B1074" Blueprint
3. Select "Launch"
4. 3 Titan engine is already turned on, when Blueprint is loaded, you don't need to turn on the engines manually.
5. Switch the throttle "on"
6. From the game menu, turn on **Infinity Fuel** and **Unbreakable Parts** sandbox mode, to make the reassembly phase easier.

7. Increase the power until vehicle raising and put the vehicle to the edge foundation (to prevent the vehicle from disappearing during the second stage loaded at the center of the Foundation).
8. You can build your own Strongback or Reassemble tower to support the vehicle during reassembly in a vertical position.
9. Place the vehicle at the edges of the foundation or your own strongback.
10. Then, Build New Rocket (Falcon 9 Second stage is expendable so it needs to Build New one of the second stages for each mission, except Starship which is 100% reusable both ship and the booster).
11. Load "Ds 2.7 - Trunk" and tap launch.
12. Activate **Infinity Fuel, unbreakable parts** and **No gravity** Sandbox mode to make the reassemble phase easier.
13. Now attach the Trunk attached on the second stage into the Interstage on the First stage.
14. Load "Ds 2.7 - Capsule" and tap launch.
15. Now attach the Capsule into the Trunk on the Second stage.
16. Detach the expendable fuel tank above the capsule, destroy it.
17. Deactivate the **No Gravity** sandbox mode.
18. Transfer all the fuel remaining on the capsule into the fuel tank holder.
19. Undock the Nose Cone from it's holder and detach the holder instantly.
20. Now the vehicle Reassembly phase has finished.

3.1.3 STAGING

Follow these configurations that should be applied on the vehicle to operate nominally. Remember to double check everything to prevent abnormal configurations or incorrect vehicle timeline events.

For Falcon 9 flight read Falcon [User's Guide](#), this guide only for Dragon flight sequences after separated from the second stage.

TIMELINE SEQUENCES :

1. NOSE CONE DEPLOYMENT

Follow this step carefully :

1. Reorient the spacecraft into a straight 0 degree position.
2. Tap the docking port located on the left side of the nose cone.
3. When the nose cone separated, reorient the spacecraft into 90 degree horizontal position.
4. adjust the spacecraft position to catch up with the nose cone docking port.

2. RENDEZVOUS TO ISS

1. Use RCS to cancel the velocity until it matches with the ISS.
2. Slowly head toward the ISS docking port or your custom PMA adapter.

3. DOCKING AND UNDOCK

Tap the docking port located on the front of the vehicle to undock.

4. TRUNK CARGO DEPLOYMENT

Tap the excess docking port part on the right side of the trunk to release the payload.

5. DEORBIT AND RE ENTRY

1. Use RCS to deorbit
2. During deorbit tap the left side docking port of the capsule to separate the nose cone.
3. Transfer some fuel from the Trunk into the capsule about 10% or less.
4. Adjust the spacecraft position to make the nose cone docked to the upper docking port as the first position before nose cone deployment sequence.
5. Before re-entry Tap the bottom right docking port of the capsule to separate the Trunk
6. During re-entry, reorient the spacecraft in an upright position.
7. Don't use RCS to prevent the fuel depletion and the capsule doesn't have fuel to return to the launch site faster.

6. PARACHUTE DEPLOYMENT

When the capsule about 1000 m above the surface deploy 3 parachutes located on the left side of the nose cone, to slow down, then deploy all the parachutes when the capsule reaches 100m above surface.

5. CAPSULE RECOVERY

Recovery is a process to return a vehicle into the launchpad, then refuel to make the booster ready to re-launch for the future upcoming mission.

5.1 RECOVERY

After all mission sequences and the capsule was touched down, Capsule can be reused for the next mission, so it needs to perform Return Burn. You need to activate Sandbox mode : **Infinity Fuel**, **No Atmospheric Drag** and **Unbreakable Parts** to recover and reassemble the capsule into a new second stage with new Trunk and Nose Cone.

5.1.1 RETURN TO LAUNCHSITE

Return Sequences

1. REFLOWN

Turn on 2 Titan Engines and power up to 100%, heading and set drop range into the launchpad. If the drop range has adjusted then set the throttle to 0%.

2. REACH APOGEE

After reaching an apogee, let the vehicle coast to it's drop range point.

3. LAUNCHSITE LANDING

Power up 100% to decrease the velocity and prepare to land. Place the vehicle to the edge of the launchpad foundation.

5.1.2 RE-ATTACHING

1. Build a New second stage with Trunk, Nose Cone and the holder attached.
2. Control the capsule and activated **Infinity Fuel, Unbreakable Part** and **No Gravity** sandbox mode.
3. Using RCS, attach the capsule into the trunk.
4. Transfer all the fuel remaining on the capsule into the Nose Cone holder.
5. Deactivate **No Gravity** and Tap separator and the side docking port of the Nose Cone holder.
6. Let the Nose Cone falling into the Capsule and docked, now the Dragon Second stage is ready to use for the next mission as long there's no damage on the capsule.

5.2 DAMAGED PARTS

Dragon spacecraft SpaceX - SFS Version is a reusable spacecraft, the reusable part of the Spacecraft is on the Capsule, the rest is expendable and needs to build new one except the capsule.

If the spacecraft gets damaged during touchdown operations, the spacecraft has to be thrown away and Build New one, because it cannot function properly, but you'll lose the reusability.

6. ACRONYM

Vehicle

- Apogee : Highest altitude point of the orbit or trajectory.
- Booster : Usually a first stage to lift the rocket at sea level or at atmospheric conditions.
- Burn : Ignition the engine to perform many maneuvers.
- Docking port : A part to connect another vehicle into one controlled vehicle.
- Foundation : Ground fixed flat solid structure to support rocket launch in Spaceflight Simulator.
- Grid Fins : 2 Landing legs modified to provide aerodynamic advantage when deployed during Landing, utilized air drag on the top of the structure.
- Interstage : Fairing structure to connect First stage and Second stage.
- Landing : A procedure to land vehicle safety on earth surface.
- MECO : Main Engine Cut-Off.
- Rocket : Controllable object which produces energy to accelerate using a rocket engine.
- Rover : Controllable object which produces energy to accelerate using a wheel.
- Vehicle : Controllable object, usually a rocket or rover.

World

- Aerodynamic : The way air moves around things.
- Air : Air is a mixture of many gases and tiny dust particles.
- Altitude : Height above the ground.
- Drag : Force which tends to slow the movement of an object.

- Ground : The surface of the Earth.
- GTO : Geostationary Transfer Orbit, intermediate step for reaching their final orbit at GEO.
- GEO : Geostationary Earth Orbit, 11.900 km Spaceflight Simulator.
- HEO : High Earth Orbit called GEO orbit.
- LEO : Low Earth Orbit, at altitude of 667 km in Spaceflight Simulator.
- Orbit : Path of the object takes in space around a star, a planet, or a moon.
- Sequence : A set of related events.
- Trajectory : Something follows its path through space and time.

7. CONTACT INFORMATION

SpaceX - SFS is a community name, not affiliated with SpaceX in shape, or form.

Contact us on [Gmail](#)
Blueprint & Launch at [Website](#)
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