

# Falcon 9 version 1.0 and v1.1

A 1:144 scale model from Acme Engineering

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Instructions version 7

Changes:

v3: added decals

v4: added info on measurements (stage length)

v6 2014-03-14: changed the second stage measurements for F9 v1.0

v7 2014-05-05: removed obsolete parts, updated the instructions to match the latest version of all parts

v8 2014-05-18: changes in formatting only

## Table of Contents

Falcon 9 version 1.0 and v1.1.....	1
Before you buy.....	1
Versions you can build and parts you need.....	2
Falcon 9 version 1.0.....	2
Falcon 9 version 1.1.....	3
Assembly instructions for Falcon 9 v1.0.....	4
The first stage engine cluster for v1.0.....	4
Bottom of the first stage.....	5
Assembly instructions for Dragon and payload fairing.....	6
Dragon capsule.....	6
Large payload fairing.....	7
Assembly instructions for Falcon 9 v1.0.....	8
Decals.....	9
Notes on materials.....	10
White Strong & Flexible.....	10
White Strong & Flexible Polished.....	10
Frosted Ultra Detail.....	10
Frosted Detail.....	10
White Detail.....	10

## Before you buy

This is not a commercial-quality model kit. I've created some parts that would be difficult to scratchbuild with traditional techniques, but they are not a complete kit. You will have to do some scratchbuilding. The following items are not available:

- The main body of the rocket
- The solar panel shrouds on the Dragon trunk

Note that I offer parts in two different scales: 1:144 and 1:200. Make sure to order parts in the

correct scale!

This is my first foray into 3D printing. I have made test prints of all the parts, but the first few sales have shown that issues can still crop up. I will fix these when they arise. Please let me know if there are problems.

## Versions you can build and parts you need

You can build 2 versions of the Falcon 9:

1. with a Dragon capsule, or
2. satellite launcher with the large payload fairing.

### ***Falcon 9 version 1.0***

For Falcon 9 version 1.0 you need:

1. Falcon 9 v1.0 First stage engines
2. Falcon 9 v1.0 First stage parts (this is the bottom section of the first stage)
3. Falcon 9 v1.0 Second stage fasteners (these connect the second stage to the interstage)
4. to be supplied by you: a section of 1 7/8" 25 mm tubing, the length is listed in the table below

For the Dragon version you also need the Dragon capsule.

For the satellite launcher you need the large payload fairing.

Based on the photos of the CRS 1 flight, these are my estimates for the lengths of the rocket components:

(all estimates are  $\pm 60$  cm/2")

	original (m)	in 1:144 (cm)	inches
first stage (full length of the stage)	31	21,53	8,48
First stage (tubing section only: this is the full length minus the bottom section)	29,1	20,21	7,96
interstage	6,4	4,44	1,75
2nd stage	4,6	3,19	1,26
Dragon trunk	2,8	1,94	0,77
Total length of tubing	42,9	29,79	11,73

There was some variation between flights: the second F9 flight had an interstage of 7 m length, SpaceX even published a length of 8 m at one point.

## **Falcon 9 version 1.1**

For Falcon 9 version 1.1 you need:

1. Falcon 9 v1.1 Engines and fasteners (this is the first stage engines set plus the fasteners that connect the second stage to the interstage)
2. to be supplied by you: a section of 1<sup>1</sup>/<sub>2</sub> mm tubing, the length is listed in the table below

For the Dragon version you also need the Dragon capsule.

For the satellite launcher you need the large payload fairing.

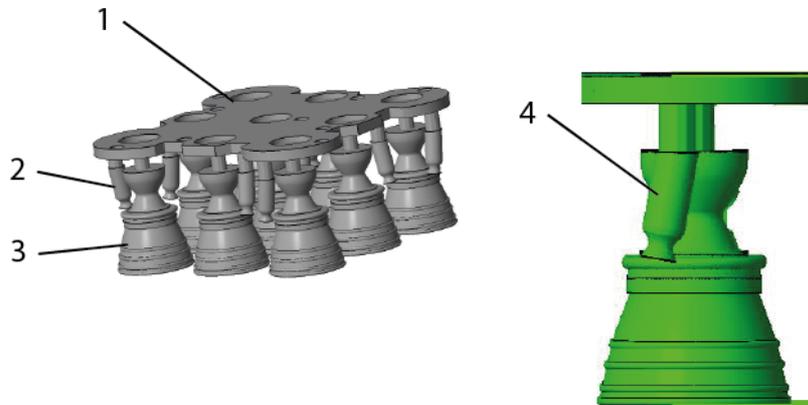
Based on photos of the SES 8 flight, these are my estimates for the lengths of the rocket components.

(all estimates are  $\pm 1$  m)

	original (m)	in 1:144 (cm)	inches
first stage (full length of the stage)	41	28,47	11,21
First stage (tubing section only: this is the full length minus the bottom section)	40,75	28,30	11,14
interstage	6	4,17	1,64
2nd stage	8,3	5,76	2,27
Dragon trunk	2,8	1,94	0,77
Total length of tubing for Dragon version	57,85	40,17	15,82
Total length of tubing for satellite launcher	55,05	38,23	15,05

# Assembly instructions for Falcon 9 v1.0

## *The first stage engine cluster for v1.0*

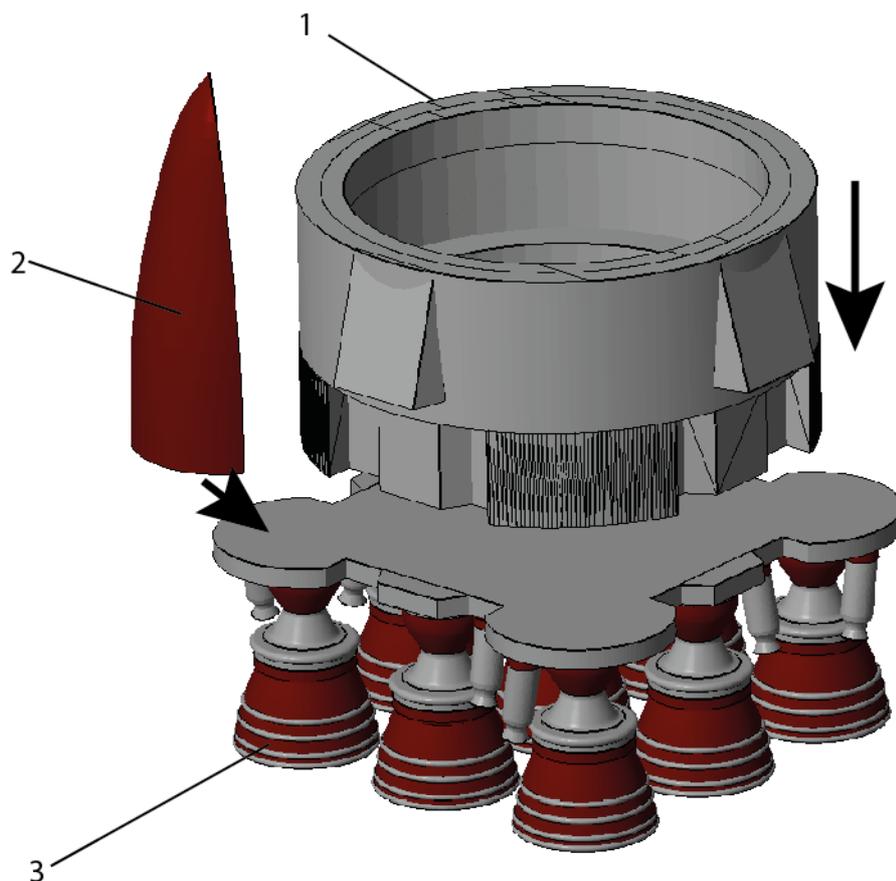


- 1 Base plate with locator holes
- 2 Turbopump exhaust
- 3 Engine nozzle
- 4 Angle of the turbopump exhausts.

Note: The walls in this part are very thin and can be brittle.

1. Note the angle of the turbopump exhausts.
2. Remove the engines and turbopump exhausts from the base plate.
3. Remove the sprues.
4. Paint the base plate, the engines and turbopump exhausts.
5. Glue the engines and turbopump exhausts into the locator holes. Make sure the turbopump exhausts point in the correct direction.

## **Bottom of the first stage**

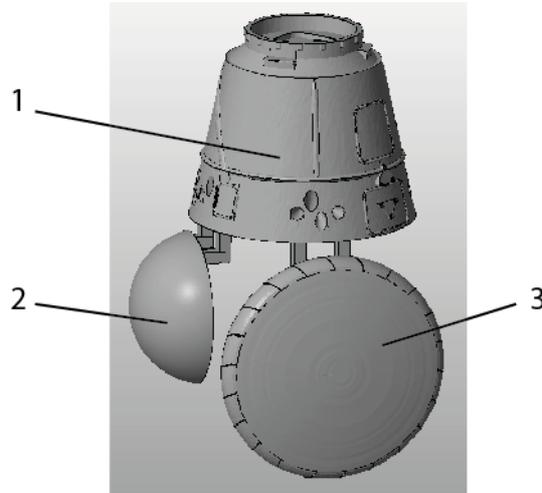


- 1 Bottom of the first stage
- 2 First stage engine fairing (4x)
- 3 Engine cluster

1. Place the part 'Bottom of the first stage' on the engine cluster. Align them carefully.
2. Place the 4 engine fairings on the corners. They should fit exactly on top of the engine cluster.

# Assembly instructions for Dragon and payload fairing

## *Dragon capsule*



- 1 Capsule body
- 2 Nose cone
- 3 Heat shield

Note: The walls in this part are very thin and can be brittle.

1. Remove the heat shield and nose cone.
2. Paint the parts.
3. Glue the parts together.
4. Chamfer the edge of the tube where it will be mated with the heat shield. The heat shield should rest on the outer edge of the tube, so the gap between them is as small as possible.
5. Test fit the nose cone. It may snag on the ring along the top of the capsule. If this happens, gently remove some material from the inside of the nose cone.

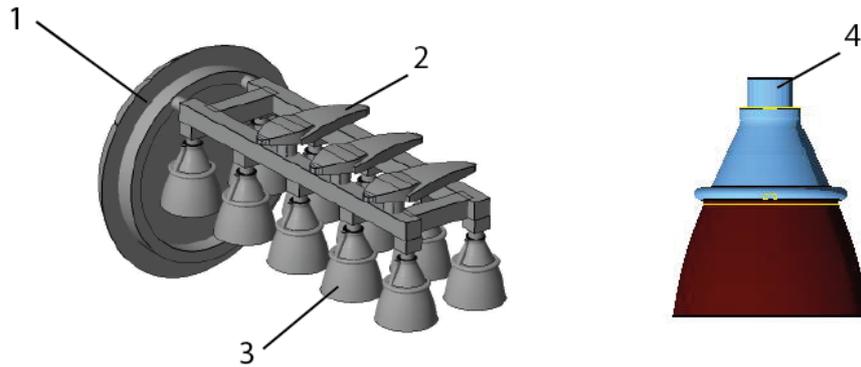
## ***Large payload fairing***



### 1 Large payload fairing

1. Detach the two halves from each other.
2. Remove the sprues.
3. Glue the two halves together.

## Assembly instructions for Falcon 9 v1.0



- 1 Base plate with locator holes
- 2 Second stage fasteners
- 3 Engine nozzle
- 4 Sprue

1. Remove the parts from the sprue.
2. Remove the cylindrical sprue (4) from the top of each engine.
3. Attach the engines to the base plate.
4. Attach the second stage fasteners to the rocket body, on the border between the interstage and the second stage.

## Decals

Place the decals according to these photos.



## **Notes on materials**

### ***White Strong & Flexible***

This material lives up to its name. Even at a wall thickness of 1 mm it is quite strong. It has a rough surface finish, feels a bit like sandpaper. The material consists of grains of plastic that are fused together.

It's difficult to sand smooth. Sandpaper of the grades we normally use removes very little material. I rarely use sandpaper with a coarser grit than 400 on my models, but for this material even 280 grit hardly makes an impression.

It's also a bit difficult to cut through. I resorted to a hacksaw to cut through some of the sprues.

To get a completely smooth surface, I think a thick primer is the way to go. I used a spray primer to good effect.

WSF readily accepts all kinds of paint. Modelling enamels and acrylics work without problems. It does absorb a lot of paint, so use a primer first.

### ***White Strong & Flexible Polished***

This is the same base material as White Strong & Flexible. After printing, it is polished in a pebble bed. It has a slightly smoother finish, but it's still a grainy texture.

### ***Frosted Ultra Detail***

This material behaves much like the resin I've seen in resin model kits. It's a bit brittle, but easy to sand and cut. Note that it reacts badly to enamels. Acrylic paint should be less of a problem.

### ***Frosted Detail***

I haven't seen this material yet, but I suspect it will be similar to Frosted Ultra Detail.

### ***White Detail***

I haven't seen this material yet. According to other users, this is a different material to the Frosted materials so it will react to paint differently.