

## The Challenges of Getting to Mars: The Cruise to Mars

Music

Voice of Mission Control: We have spacecraft separation. And confirmation from our video system.

Fernando Abilleira: Approximately 50 minutes after launch, the spacecraft separates from the upper stage of the launch vehicle.

Six minutes after that the spacecraft transmitter sends a signal back to earth which is received by the tracking stations.

Once we receive that signal, we are ready to send our first command up to the spacecraft.

And that actually marks the beginning of the cruise phase.

Music

Erisa Hines: There are some incredible challenges on the way to Mars.

One of the things is there are always anomalies; there are always things that are going to go wrong that you never expected.

You have a baby spacecraft that is on its way to Mars and its seeing the space environment for the first time.

So it's going to see temperature ranges from minus 250 degrees Fahrenheit to plus 250 degrees Fahrenheit.

And you've got instruments all over the spacecraft, you've got propellant lines that you can't let freeze.

And so there's always this challenge of keeping the entire spacecraft tuned thermally.

Fred Serricchio: Some of the things we're going to be doing during the cruise phase are some trajectory correction maneuvers, which are basically pushing us along the path of where we want to end up when we arrive on Mars.

The launch vehicle puts us on a specific path on a trajectory and along the way from here to Mars over the 9 months that we'll be flying there, we need to make small corrections to that.

Erisa Hines: If you were trying to shoot a bow and arrow at a bulls-eye, at a target, and you had drawn back the bow and you had shot off the arrow, and you realized all of a sudden that it wasn't actually going to hit the target

How great would it be if you could pause in the middle, make a slight adjustment to the arrow and watch it hit the target?

Steven Collins: We have given ourselves 6 opportunities to make a trajectory correction maneuver.

And each of those correction maneuvers uses the thrusters on the spacecraft to give a little push to the spacecraft to correct its trajectory.

Erisa Hines: One of the things that makes landing on another planet so difficult, is that we're essentially trying to hit a moving target.

The spacecraft left a planet that was spinning around the sun at its own speed and we're now aiming for another planet

And we can't just aim for where the planet is at the time that we launch, but we have to aim for where we think the planet's going to be by the time that we get there.

Steven Collins: All of those motions; the navigation team has to carefully track and predict where things are going to be in the solar system, in order for us to successfully navigate to Mars.

Fred Serricchio: The trip from here to Mars is over 8 and-a-half months and we need to make sure that we monitor all of the sensitive instruments, science and engineering to make sure that over that 8 and-a-half month journey, everything is working properly.

Erisa Hines: The better we do our job during the cruise phase of the mission, the better the entry, descent, and landing phase of the mission will go, as well as the surface phase.

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