

NASA's Mars 2020 Supersonic Parachute: Test Flight #1

At 6:45 a.m. on October 4 NASA performed its first supersonic parachute test in support of its upcoming Mars 2020 mission.

The 58-foot-tall sounding rocket launches off the eastern shore of Virginia, out of NASA's Wallops Flight Facility. This two-stage rocket accelerates to over three times the speed of sound and an altitude of over 50 kilometers—or nearly halfway to the edge of space.

Once the second stage has burned out, it separates from the payload and the payload continues to the desired test condition.

Onboard is a new payload designed to test parachutes in a low-density environment and at supersonic conditions analogous to what NASA's Mars 2020 mission, America's next Mars rover, would encounter as it comes through the Martian atmosphere.

As the payload dives back into the atmosphere, the roar of the oncoming wind becomes more audible.

Onboard computers detect that it has achieved the proper test conditions and subsequently deploy the parachute. A hundred pounds of nylon, Technora® and Kevlar® —are shot out the back of the vehicle at nearly 100 miles an hour.

In slow motion—in video originally shot at a thousand frames per second but played back here at 30 frames per second—we see the initial suspension lines deploying out of the pack and taking the parachute backwards where it will ultimately inflate in nearly half a second.

Researchers watching this video are observing the initial motions of the fabric, the uniformity of the inflation, and how symmetric it is. And they begin inferring which areas may be more structurally loaded or stressed than other areas of the parachute. Every frame will be examined closely to look for signs of damage in any of the stitching used to hold the canopy together.

At the moment of full inflation the parachute is going 1.8 times the speed of sound or nearly 1300 miles an hour, and generating nearly 35,000 pounds of drag force—drag that would be necessary to help slow a payload down as it was entering the Martian atmosphere.

This was the first of several tests in support of NASA's Mars 2020 mission. The data obtained during these tests are critical for better understanding the environment and dynamics of a supersonic parachute inflation at Mars.