

First powered flight on another planet

Perseverance

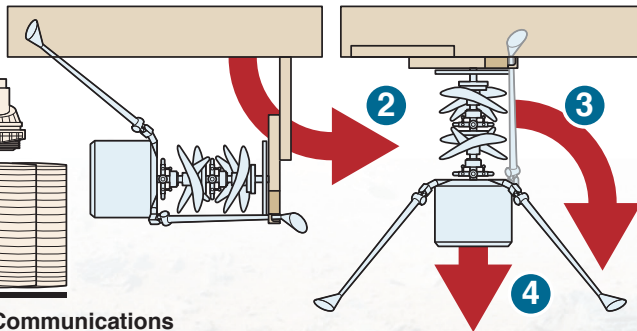
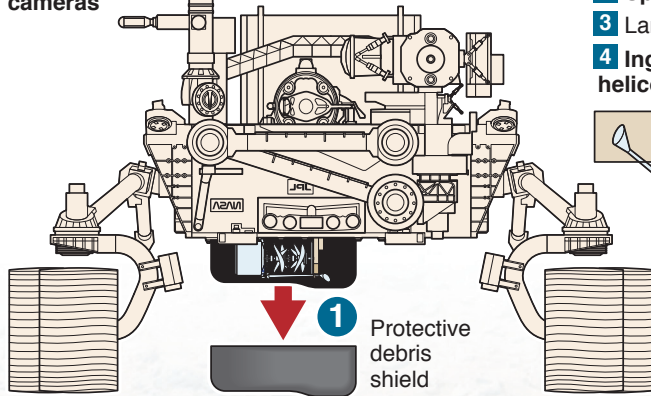
rover
landed
Feb 18

Mastcam-Z
cameras

NASA engineers plan to fly a miniature helicopter on Mars in an aviation experiment that, if successful, will mark the first ever powered, controlled flight by an aircraft on another celestial body

DEPLOYMENT: *Ingenuity* helicopter lowered from belly of Perseverance rover

- 1 Protective debris shield dropped – Perseverance drives to centre of airfield
- 2 Spring-loaded arm rotates *Ingenuity* upright
- 3 Landing legs released
- 4 *Ingenuity* lowered to surface – rover leaves so helicopter's solar panel can recharge batteries



MARS INGENUITY HELICOPTER

Solar panel

Communications antenna

History marked:

Tiny swatch of fabric from wing of *Wright Brothers'* 1903 *Flyer* fixed to solar panel

Twin rotors: Four carbon-fibre blades spin in opposite directions at 2,400 revolutions per minute – three times faster than regular helicopter – to overcome thin Martian atmosphere, 1% density of Earth

Electronic box: Computers; Lithium-ion batteries; Laser altimeter; Colour imaging camera; Navigation camera

Upper and lower rotors

Insulated fuselage frame

Landing legs: Aluminium hinges dampen force of impact

Flight zone: Flat and relatively hazard-free square of terrain on Jezero Crater

Airfield: 10x10m

Rover landing location

Van Zyl Overlook: Perseverance will observe *Ingenuity* from distance of 60m and relay data to and from helicopter

1.2m
0.49m
Weight: 1.8kg
Cost: \$80m

First flight: *Ingenuity* aims to rise 3 metres and hover for 30 seconds before returning to helipad

If successful, four more increasingly complex flights are planned