

Artemis I Countdown 101

Before the Artemis I mission launches on its way around the Moon, the launch team at Kennedy Space Center and supporting teams across the country will begin the launch countdown about two days before liftoff.

The launch countdown contains "L Minus" and "T Minus" times. "L minus" indicates how far away we are from liftoff in hours and minutes and does not include built-in holds. "T minus" time is a sequence of events that are built into the launch countdown where counting and holds are inserted.

The 730,000 gallons of propellants that will be loaded into the rocket are liquid oxygen (LO2) and liquid hydrogen (LH2).

Pauses in the countdown, or "holds," are built into the countdown to allow the launch team to target a precise launch window, and to provide a cushion of time for certain tasks and procedures without impacting the overall schedule. For the Artemis I countdown, planned built-in holds vary in length and occur at the following times: L-8 hours, 40 minutes, and L-40 minutes.

Here are some of the key events that take place at each milestone after the countdown begins.

L-45 hours and counting

- The launch team arrives on their stations and the countdown begins (L-45 hours)
- Fill the water tank for the sound suppression system (L-45 hours)
- The Orion spacecraft is powered up (L-39 hours, 50 minutes)
- The core stage is powered up (L-34 hours, 40 minutes)
- Final preparations of the four RS-25 engines (L-33 hours, 20 minutes)

L-30 hours and counting

- The Orion crew module hatch is closed (L-30 hours)
- Leak checks are completed on the Orion spacecraft (L-29 hours, 30 minutes)
- The Crew Access Arm is retracted (L-27 hours, 30 minutes)
- Side flame deflectors are moved into place (L-24 hours)

L-14 hours and counting

- The interim cryogenic propulsion stage (ICPS) is powered up (L-13 hours, 30 minutes)
- All non-essential personnel leave Launch Complex 39B (L-12 hours)

L-8 hours, 40 minutes and counting

- The launch team arrives for the start of the terminal countdown (L-8 hours, 40 minutes)
- The launch team conducts a weather and tanking briefing (L-8 hours, 40 minutes)
- Built in countdown hold begins and lasts approximately one hour (L-8 hours, 40 minutes)
- Launch team decides if they are "go" or "no-go" to begin tanking the rocket (L-8 hours)
- The launch team verifies they are within the launch commit criteria (L-8 hours)

L-7 hours and counting

- Core Stage LO2 chilldown (L-7 hours)
- Core stage LO2 fast fill (L-6 hours, 15 minutes)
- Core Stage LO2 CS slow fill (L-5 hours, 50 minutes)

- Core Stage LH2 chilldown (L-5 hours, 40 minutes)
- Core Stage LH2 slow fill (L-5 hours, 30 minutes)
- Core Stage LH2 fast fill (L-5 hours, 5 minutes)

L-4 hours, 30 minutes and counting

- ICPS LH2 chilldown (L-4 hours, 30 minutes)
- Orion communications system activated (RF to Mission control) (L-4 hours, 20 minutes)
- Core Stage LH2 topped off (L-4 hours, 5 minutes)
- Core Stage LH2 replenished (L-4 hours)
- ICPS LH2 fast fill (L-4 hours)
- Core Stage LH2 replenished (L-4 hours)

L-3 hours, 30 minutes and counting

- Core stage LO2 is topped off (L-3 hours, 30 minutes)
- ICPS LO2 chilldown begins (L-3 hours, 20 minutes)
- Core stage LH2 validation and leak test (L-3 hours, 20 minutes)
- ICPS LH2 validation and leak test (L-3 hours, 20 minutes)
- Core Stage LO2 replenished (L-3 hours, 18 minutes)
- ICPS LH2 tank topped off (L-3 hours)
- Orion communication system activated (L-3 hours)
- ICPS/SLS telemetry data verified with Mission Control and SLS Engineering Support Center (L-3 hours)
- ICPS LH2 replenished (L-2 hours, 30 minutes)
- ICPS LO2 validation and leak test (L-2 hours, 30 minutes)
- ICPS LO2 topped off (L-2 hours, 20 minutes)
- ICPS LO2 replenished (L-2 hours, 10 minutes)

L-40 minutes and holding

- Final NASA Test Director briefing is held
- Built in 30-minute countdown hold begins

L-15 minutes and holding

- The launch director polls the team to ensure they are “go” for launch

T-10 minutes and counting

- Booster flight termination system moves to internal power (T-10 minutes)
- Orion ascent pyros are armed (T-6 minutes)
- Orion set to internal power (T-6 minutes)
- CS LH2 terminate replenish (T-5 minutes, 57 seconds)
- Core Stage auxiliary power unit starts (T-5 minutes, 57 seconds)
- ICPS LO2 terminate replenish (T-3 minutes and 30 seconds)
- Boosters transition to internal power (T-2 minutes)
- ICPS switches to internal battery power (T-1 minute, 57 seconds)
- Core stage switches to internal power (T-1 minute, 30 seconds)
- ICPS enters terminal countdown mode (T-1 minute, 20 seconds)
- ICPS LO2 terminate replenish (T-1 minute)
- ICPS LH2 terminate replenish (T-50 seconds)
- Ground launch sequencer sends “Go for automated launch sequencer” command (T-33 seconds)

- Core stage flight computer to automated launching sequencer (T-30 seconds)
- Hydrogen burn off igniters initiated (T-12 seconds)
- Ground launch sequencer sends the command for core stage engine start (T-10 seconds)
- RS-25 engines startup (T-6.36 seconds)

T-0

- Booster ignition, umbilical separation, and liftoff