



Crawler-Transporter 2

NASA's Kennedy Space Center in Florida has upgraded one of its two massive crawler-transporters as the agency continues to prepare for its return to the Moon and journey beyond to Mars. Crawler-transporter 2 (CT-2) is more than 50 years old, but with the current modifications performed by the Exploration Ground Systems (EGS) Program, CT-2 is expected to be in service for many years to come.

The crawler is the size of a baseball infield. The crawler's top speed is one mile per hour loaded and two miles per hour unloaded. To date, CT-2 has traveled 2,335 miles.

Phase I modifications to the crawler include replacement of the existing roller assemblies and bearings with redesigned, upgraded assemblies and bearings that have a greater load capacity. An expanded and updated lubrication system was added to service the new assemblies. The jacking, equalization and level-

ing system cylinders and piping were replaced with redesigned and upgraded versions during Phase II modifications. Twenty-year-service life extension modifications include a total upgrade and modernization of the vehicle's control room, an expanded strain and temperature system, a new condition monitoring system, two new Cummins 1,500-kilowatt AC generators, redesigned and updated parking and service brakes, control system modifications, ALCO diesel engine refurbishments, a complete reconditioning of all gear cases and gears, and a new paint job. These redesigns will give the crawler a longer operational life and enable the giant vehicle to carry the heavier loads anticipated with the Space Launch System (SLS) rocket.

Engineers have conducted a series of incremental tests with CT-2 to prepare for the first integrated flight test of NASA's SLS and Orion spacecraft, known as Artemis I. NASA has tested different rollout variations



NASA's upgraded crawler-transporter 2 (CT-2) is driven to the Vehicle Assembly Building (VAB) during a practice run at Kennedy Space Center on May 1, 2019. The Exploration Ground Systems Program at Kennedy oversaw upgrades to the crawler. CT-2 will carry the mobile launcher with Orion atop the Space Launch System rocket from the VAB to Launch Pad 39B for the launch of Artemis I. Photo credit: NASA/Kim Shiflett

and combinations as each modification was completed. All modifications and upgrades were operated and tested with an unloaded crawler, a shuttle-era mobile launcher (ML) platform standing in for the new ML and then, finally, with a rollout of the newly completed ML 1 to Launch Pad 39B and back to the Vehicle Assembly Building (VAB).

CT-2 will carry the ML with the SLS atop from the VAB to the pad. The crawler has four reinforced pickup points known as crawler interface blocks – one on each corner – that secure the ML interface blocks into place. The ML interface blocks are the interface points that allow the crawler to lift and transport the ML to the pad. The crawler does not interface directly with the SLS rocket – only the ML or future platform.

Once CT-2 makes its eight-hour trek to the pad, the ML and SLS will be lowered onto pad mount mechanisms. After power has been transferred from the crawler to the pad, CT-2 will roll

back down the pad slope and park just outside the pad perimeter gate. CT-2 will wait there until a few days prior to launch in case a rollback is required. It will then roll to the mobile service structure park site, which is located outside of the launch environment to protect the crawler from any launch-induced damage.

CT-2 Facts

Weight: Approximately 6.6 million pounds (or the weight of about 15 Statues of Liberty or 1,000 pickup trucks).

Height: Varies from approximately 20 feet to 26 feet, based on the position of the jacking, equalization and leveling cylinders.

Load Capacity: Able to transport 18 million pounds (or the weight of more than 20 fully loaded 777 airplanes).



An aerial view of crawler-transporter 2 showing the four pickup points that will be used to lift the mobile launcher with NASA's Space Launch System and Orion spacecraft on top for the trip to Launch Pad 39B for Artemis I. Photo credit: NASA

For more information about EGS, visit: <http://www.nasa.gov/groundsystems>

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