



**PETRON  
PLUS™  
FORMULA 7**



# NASA CRAWLER-TRANSPORTER

▶ **PETRON PLUS™ FORMULA 7 HI-TEMP, EXTREME-PRESSURE, MULTI-PURPOSE LITHIUM COMPLEX GREASE**

**CUSTOMER TESTIMONIAL**

## CUSTOMER & TEST PROFILE

The crawler-transporters are a pair of tracked vehicles to transport spacecraft from NASA's Vehicle Assembly Building (VAB) along the Crawlerway to Launch Complex 39. They were originally used to transport the Saturn IB and Saturn V rockets during the Apollo Skylab and Apollo-Soyuz programs. They are currently used to transport the Space Shuttle. It is planned for them to carry the upcoming Ares I and Ares V rockets for the Constellation program as well. The crawler-transporters carry vehicles on the Mobile Launcher Platform, and after each launch return to the pad to take the platform back to the VAB.

The two crawler-transporters were designed by Bucyrus International and built by Marion Power Shovel using components designed and built by Rockwell International at a cost of \$14 million each. When they were built, they were the largest tracked vehicles in the world. The German Bagger 288 excavator is now the largest tracked vehicle in the world, although the crawler-transporter is the largest self-powered one.

The crawler-transporter has a mass of 2,721 tonnes – 3,000 short tons (2,700,000 kg; 6,000,000 lbs) – and has eight tracks, two on each corner. Each track has 57 shoes, and each shoe weighs 1,984 pounds (900 kg). The vehicle measures 131 feet (40 m) by 114 feet (35 m). The height from ground level to the platform is adjustable from 20 ft (6.1 m) to 26 ft (7.9 m), and each side can be raised and lowered independently of the other. The crawler uses a laser guidance system and a leveling system to keep the Mobile Launcher Platform level within 10 minutes of arc, while moving up the 5% grade to the launch site. A separate laser docking system provides pinpoint accuracy when the crawler-transporter and Mobile Launch Platform are positioned in the VAB or at the launch pad.



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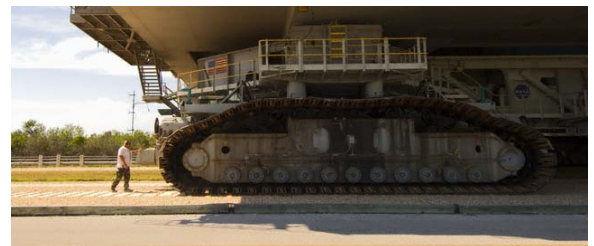
The crawler has 16 traction motors, powered by four 1,341 horsepower (1,000 kW) generators, in turn driven by two 2,750 horsepower (2,050 kW) Alco diesel engines. Two 1,006 horsepower (750 kW) generators, driven by two 1,065 horsepower (794 kW) engines, are used for jacking, steering, lighting, and ventilating. Two 201 horsepower (150 kW) generators are also available to power the Mobile Launcher Platform. The crawler's tanks hold 5,000 US gallons (19,000; 4,200 imp gal) of diesel fuel, and it burns 150 gal/mi (350 L/km).

The crawler is controlled from two control cabs located at either end of the vehicle, and travels along the 3.5 miles (5.6 km) Crawlerway at a maximum speed of 1 mile per hour (1.6 km/h) loaded, or 2 miles per hour (3.2 km/h) unloaded. The average trip time from the VAB along the Crawlerway to Launch Complex 39 is about five hours. Each crawlerway is 7 ft (2 m) deep and covered with Alabama and Tennessee river rock for its low friction properties to reduce the possibility of sparks. In 2000, NASA unearthed and restored an Apollo-era segment of the crawlerway to provide access to a high-bay building in order to provide protection from a hurricane.

Kennedy Space Center has been using the same two crawlers since their initial delivery in 1965. In their lifetime, they have traveled more than 2,500 miles (4,000 km). NASA will continue to use crawlers when the Space Shuttle is retired in 2010 and the Ares I and Ares V take its place. Due to their age and need to support the heavier Ares V (with its launch umbilical tower), NASA will modify the crawler's engines in order to have the ability to carry the heavier loads envisioned for the Ares V for both its lunar and, later, planetary roles.

## CUSTOMER TESTS & REPORTS

Petron Plus™ Formula 7 Hi-Temperature, Extreme-Pressure, Multi-Purpose Lithium Complex Grease was used in the lubrication of the tracks of the crawler.



Crawlerway junction at the LC-39 observation gantry. The right track leads to pad LC-39A (pictured with the Space Shuttle Endeavour), while the left track leads to pad LC-39B.

