POSTER 1 - Left

Measurements

The original Centaur rocket is:

- **30 feet long**
- **10 feet in diameter**
- Weighed more than **35,000 pounds** when fully fueled

To keep weight down, the tank is made of stainless steel that is less than 200ths of an inch thick. This is thinner than a dime.

Liquid Hydrogen

The Centaur was the first space vehicle to use a high performance liquid-hydrogen & liquid-oxygen propellant combination, which results in the **massive thrust** (pushing force) needed to launch heavy payloads into orbit. It is extremely difficult to work with and operates at **420 degrees below zero**.

NASA Lewis Research Center

The Centaur program was headquartered in Cleveland, Ohio for 35 years. In 1962, Lewis engineers, who were already experts in the field of liquid hydrogen, took on the task of perfecting the rocket. They accomplished this by implementing an intense research and development program. The Lewis team also worked on upgrading the Atlas booster, which would partner with the Centaur to carry it off the launchpad.

Dr. Abe Silverstein

Director of NASA Lewis (1961 - 1969)

From 1962 until his retirement, Dr. Abe Silverstein was the **guiding force** of the Centaur Program.

POSTER 2 - Middle

Planets

The Centaur upper stage rocket, working with Atlas and Titan boosters, has launched probes and fly-by's to other planets, such as **Mars, Mercury, Neptune, Jupiter, Saturn, Uranus, and Venus**.

Titan-Centaur

In the 1970's, NASA planned more complex missions which included launches to study Mars, the outer Solar System, and eventually interstellar space. Centaur was combined with the Air Force Titan III booster to provide the capability to launch the larger spacecrafts that were needed to achieve these goals.

What is Centaur?

Centaur, also known as “America's Workhorse In Space”, was the world's first high-energy upper stage rocket and has been crucial to launching a tremendous variety of the nation's most difficult and historic space missions. The Centaur's long-lasting popularity is due mainly to its combination of high performance fuel, incredibly efficient engine, and amazingly accurate avionics. Coupled with booster rockets such as the Atlas and Titan, the Centaur has helped to revolutionize communication, broaden scientific knowledge, and increase the frontiers of space.

Types of Missions

From lower earth orbit to high orbit to the Moon to the great expanse of interstellar space. The Centaur can accomplish all of these, making it one of the most demanded upper stage rockets in history.

Payloads

Payloads weighing as much as **5,000 pounds** could be carried to high Earth orbit in combination with the Atlas first stage.

The path to interplanetary space came through Cleveland, Ohio

POSTER 3

Moon Landing

In May of 1966, an unmanned lunar space craft name Surveyor 1 was launched using the Centaur upper stage rocket. It became America's very **first soft lander on the moon** and also the first American spacecraft to successfully **land on an extraterrestrial body**.

The Surveyor missions collected data and took high resolution photographs of the moon's surface. This information was key to the success of the now famous Apollo manned lunar landing missions which occurred later.

NASA

The National Aeronautics and Space Administration was established in 1958.

50th Anniversary

Centaur recently celebrated the 50th anniversary of its first successful flight that occurred on November 27, 1963.

America's Workhorse in Space

The Future

Because of its many applications and longevity, the Centaur continues to serve as America's most **powerful** and **popular** upper stage rocket. Looking to the future, the technology and design of the Centaur may possibly be the predecessor to Nuclear Thermal propulsion, which could be used to send manned missions to Mars.

Number of Missions

Over 200 unmanned missions have used the Centaur rocket.

Historic & Significant Missions

Mariner 6 - 25 February 1969 - Mars Flyby.

Mariner 9 - 30 May 1971 - Mars Orbiter.
The first spacecraft to orbit another planet.

Pioneer 10 - 3 March 1972 - Jupiter Flyby.
The first spacecraft to visit Jupiter and the first to exit the solar system.

Viking 1 - 20 August 1975 - Mars Lander.
The first spacecraft to successfully land on Mars and perform its mission.

Voyager 2 - 20 August 1977.
Jupiter/Saturn/Uranus/Neptune Flyby.
Sent to study the outer Solar System and eventually interstellar space.

Pioneer Venus 1 - 20 May 1978 - Venus Orbiter.

Cassini - 15 October 1997 - Saturn Orbiter.

New Horizons - 19 January 2006. Pluto/Charon and Kuiper Belt Flyby.

Juno - 5 August 2011 - Jupiter Orbiter.

Mars Science Laboratory - 26 November 2011. Mars Rover.

MAVEN - 18 November 2013 - Mars Scout. Mission Orbiter.

CREDITS

Concept and Design by Steam Hat: Robert L. Kline Jr. and Dru Woodard -- SteamHat.com Illustrations: Dru Woodard -- druwoodard.com