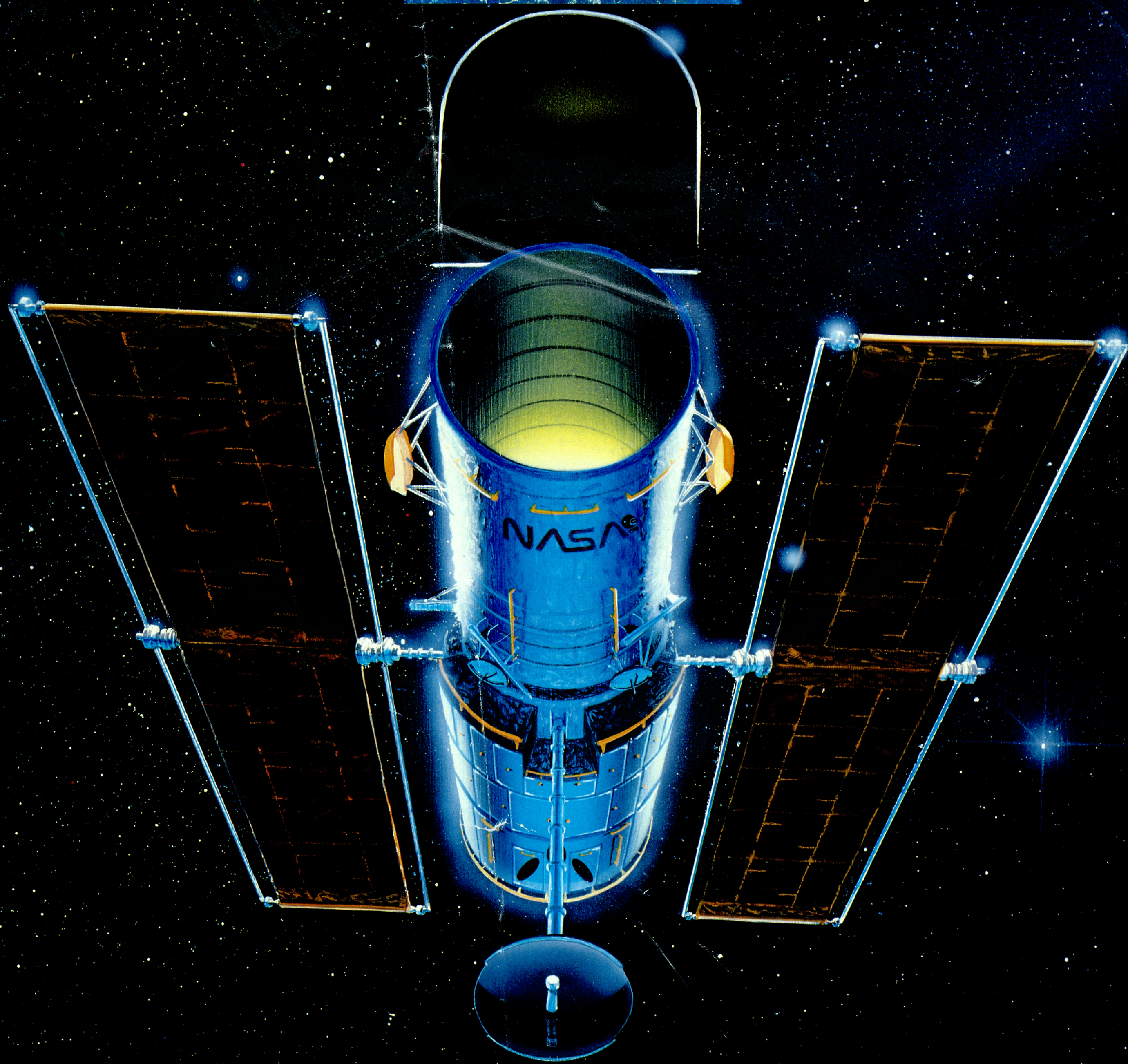


H • U • B • B • L • E

SPACE TELESCOPE

NASA'S
INCREDIBLE
TIME
MACHINE



Hubble Space Telescope

People have dreamed about traveling through time ever since H.G. Wells published his book "The Time Machine" in 1895. In a sense, that dream is about to come true. With the launch of NASA's Hubble Space Telescope, humankind will be able to look back in time and see the universe as it was billions of years ago. The discoveries astronomers make with **this incredible time machine** may help them piece together the origins of the universe and even glimpse its ultimate fate.

Light travels very fast, but space is so vast that much time passes before the light from distant objects reaches us. For example, it takes about eight minutes for light from the sun to get to Earth. So when we view the sun, we are really seeing it as it looked eight minutes before. It takes 30 minutes for light from Jupiter to reach the Earth. Light from the North Star travels 50 years before we see it, so we can only view that star as it appeared half a century past. If we

look at a galaxy so far away that it takes a million years for light to reach Earth, we are really seeing that galaxy as it was a million years ago.

NASA's Hubble Space Telescope will extend our vision by detecting light that started its journey 14 billion years ago when the universe was young. We will see the conditions that prevailed at the source when the light was emitted. So in effect, we are "looking back in time."

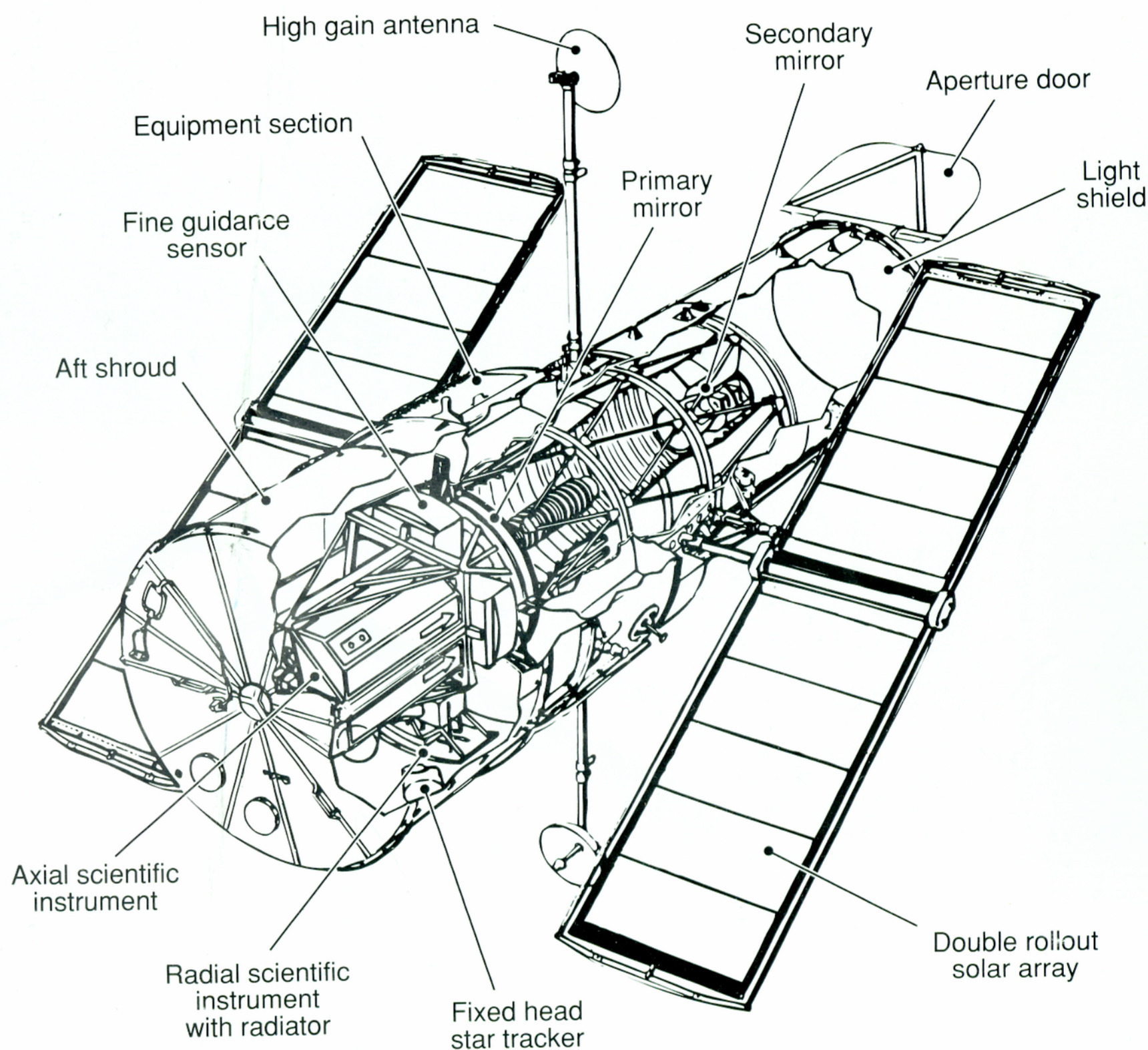
The 43-foot Hubble Space Telescope will be the largest astronomical observatory ever placed in orbit. It is named the Hubble Space Telescope in honor of the American astronomer Edwin P. Hubble. Before Hubble's work in the 1920s, no one knew with certainty that the universe extended far beyond the Milky Way. His observations of other galaxies led to his discovery that the universe is expanding.

The Space Shuttle will carry the telescope into orbit some 370 miles above Earth. Then, the Shuttle will come home, leaving the telescope to observe the universe for 15 years or longer. The Hubble Space Telescope is a major scientific resource that will be shared by scientists around the world. To keep it in top-notch condition, astronauts will visit it every few years to do routine repairs and to replace scientific instruments and other equipment as technology improves.

The 25,000-pound observatory is about the size of a bus and looks like a tower of stacked silver canisters. Each section houses important telescope components: the mirrors, the scientific instruments, electrical systems and batteries, and the pointing and control mechanisms. Solar arrays for generating electricity and antennas for communicating with operators on the ground extend from the telescope. Doors allow astronauts to remove parts for repair or replacement without bringing the telescope home.

The Hubble Space Telescope is an engineering marvel. Its electronic light collectors are so sensitive they could detect light from a flashlight a quarter of a million miles away. The surface of the telescope's primary mirror is so finely polished that if the surface of the Earth were as smooth, its highest peak would be no more than five inches high.

The Hubble Space Telescope was developed by the National Aeronautics and Space Administration under the **Office of Space Science and Applications** at NASA Headquarters in Washington, D.C. The **Marshall Space Flight Center** in Huntsville, Alabama, has been responsible for the design and development of the telescope and will manage its initial activation in orbit. **Goddard Space Flight Center** in Greenbelt, Maryland, developed the science instruments and will operate the telescope during its years of service. Goddard also manages the **Space Telescope Science Institute**, located at Johns Hopkins University in Baltimore, Maryland, which is responsible for the telescope's observing agenda. The **European Space Agency** has played a major role in development of the telescope by providing the power-producing solar arrays and one of the science instruments. The **Johnson Space Center** in Houston, Texas, is training crews for the launch, deployment, and maintenance of the Hubble Space Telescope and will be in charge of Shuttle mission operations. The **Kennedy Space Center** in Florida will ready the telescope for launch aboard the Shuttle. The **Lockheed Missiles and Space Company** in Sunnyvale, California, designed the Hubble Space Telescope; developed the telescope's support systems; assembled and tested the spacecraft; and will help check it out in orbit. **Hughes Danbury** in Danbury, Connecticut, developed the telescope's optical systems and fine guidance sensors.



NASA

Marshall Space Flight Center
Huntsville, Alabama